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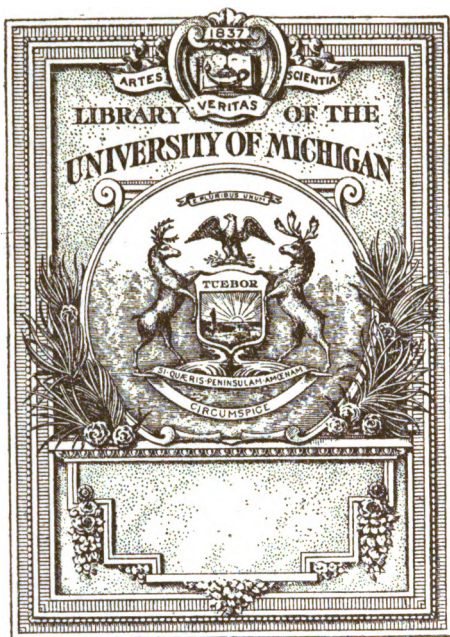
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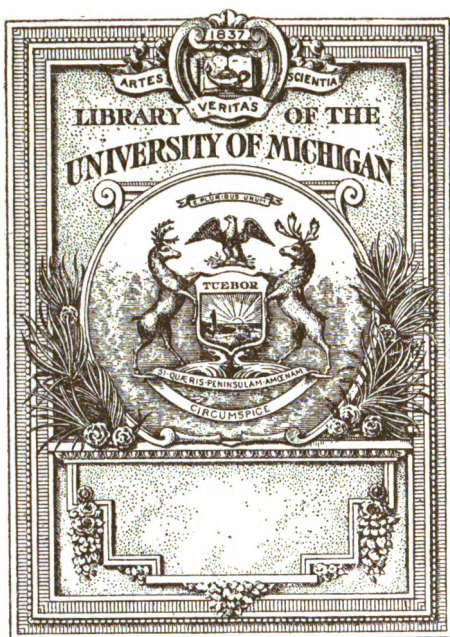
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Institute of Chemistry

OF

GREAT BRITAIN AND IRELAND.

PRESIDENT'S ADDRESS,

DELIVERED AT

THE FIRST ANNUAL GENERAL MEETING,

TOGETHER WITH

THE REPORT OF THE COUNCIL

AND

BALANCE SHEET.

LONDON:

MESSEY AND SONS, PRINTERS, 113, KENNINGTON ROAD, S.E.

1878.

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ADDRESS

DELIVERED BY

PROFESSOR FRANKLAND, D.C.L., F.R.S.,

President of the Institute of Chemistry of Great Britain and Ireland,

AT THE

FIRST GENERAL MEETING

HELD IN

THE ROOMS OF THE CHEMICAL SOCIETY,

At Burlington House, on Friday, 1st February, 1878;

ALSO

THE REPORT OF THE COUNCIL ON THE PRESENT STATE AND
PROSPECTS OF THE ASSOCIATION, AND THE TREASURER'S
BALANCE SHEET, MADE UP TO THE 31ST DECEMBER,
1877.

393874

PRESIDENT'S ADDRESS.

GENTLEMEN,

In opening the business of this the first General Meeting of the Institute, allow me to congratulate you on the successful accomplishment of a wide-spread desire that an organisation of Professional Chemists should be effected.

Not without much self-sacrifice on the part of many professional colleagues, could such a Society as ours be brought into existence under the most favourable circumstances; but several peculiar and unforeseen difficulties rendered the work, in this instance, more formidable than could have been anticipated. It will not perhaps, therefore, be unacceptable to the Members if I take this, the earliest opportunity, of laying before them a brief statement regarding the development of practical and professional Chemistry in this country, the present status of trained and educated Chemists, and the sequence of events and considerations which led to the formation and incorporation of our Institute.

Amid the increasing interest in the experimental sciences, and the extraordinary extension of scientific

teaching during the last thirty years, Chemistry among all her sister sciences, has made the most rapid advances in the organisation of a system of practical instruction, as distinguished from mere reading and attendance upon lectures.

Fully a quarter of a century before the establishment of any laboratory for the practical instruction of students in physiology or physics, considerable progress had been made in the provision of practical training for Chemists.

The establishment of the first Chemical Laboratory for the instruction of students in experimental Chemistry, by Liebig, in Giessen, gave an impulse to the growth of practical Chemistry which has extended over the whole habitable globe. About the year 1840, there collected in that laboratory, around the great master, a new school of Chemists from all nations, but especially from England; and these carried to their own countries the methods of experimental training with which they had become acquainted. Moreover, the exigencies of Medical Jurisprudence; the establishment of various branches of chemical technology in this country; the consequent legal proceedings in cases of alleged nuisance; the investigation of patent processes; and the chemical problems arising out of the supply of water and gas to towns, created a demand for chemical experts. This demand was supplied at first almost entirely from the Medical Profession—whose members were at that time the exclusive recipients of chemical instruction, which, however, although covering nearly the whole of the then known field of the science, would now be deemed

extremely meagre. Moreover, it was imparted only by lectures.

Indeed, notwithstanding the increasing demand for chemists, the establishment of schools for their practical instruction was at first but slow. Thus at the beginning of the year 1845, when I made diligent inquiry for a laboratory in which to obtain instruction in chemical analysis, I could only hear of the existence of one; and this, though under the direction of a no less eminent professor than Dr. Lyon Playfair, was in the cellar of the Royal Institution in Manchester. In the autumn of the same year, however, Dr. Playfair's laboratory was promoted to the back kitchen of a house in Duke Street, Westminster, belonging to the Department of Her Majesty's Woods and Forests.*

About the same time, the Royal College of Chemistry was opened on the Giessen system, by Dr. Hofmann, and became a new centre of attraction, scarcely inferior to its prototype. From it, and from one or two other laboratories established almost contemporaneously, soon issued a veritable army of Chemists, who instituted practical instruction throughout the length and breadth of the land. Henceforth the opportunities of becoming practically acquainted with Chemistry were greatly multiplied. It became an independent subject of instruction in schools, colleges, and universities, and thus in con-

* There were, however, at this time several classes for the study of practical Chemistry established at University College (under the direction of the late Professors Graham and Fownes) and elsewhere.

nection with the Science and Art Department alone, there were in the year 1876, as I am informed by Lieut-Colonel Donnelly, no less than 115 chemical laboratories, in which 2,400 pupils received individual practical instruction. Many of these laboratories are on a very modest scale when compared with the greater chemical temples of this and other countries, nevertheless, their number sufficiently demonstrates the enormous demand for chemical training, and the extent to which efforts have already been made to meet that demand.

This advance is doubtless due in part to the fascination of a study which brings the pupil continually into the closest contact with nature; but it has also been very greatly stimulated by the rapid increase in the number and importance of the applications of Chemistry to agriculture, technology, public health, and the daily wants of modern civilisation.

These intimate relations to daily life have long imparted to applied Chemistry the character of a profession, scarcely second in importance to others which have been similarly called into existence by the urgent wants of society; and like them, requiring organisation for its creditable and successful practice.

Some remarks of this kind were made by me in a large assemblage of Chemists, at a dinner given on the 31st May, 1872, in honour of Professor Cannizzaro's visit to this country as Faraday lecturer. I then mentioned the desirability of an organisation amongst Chemists, which should stand in the same relation to the profession of Chemistry as that occupied by the Colleges

of Surgeons and Physicians towards Medicine, the Institute of Civil Engineers, towards the profession of Civil Engineering, and the Inns of Court towards the practice of Law.

The idea was a novel one, however, and it did not at that time appear to be received with much favour. Nor was it resuscitated until the spring of 1876, when an attempt was made to originate a scheme of the kind previously contemplated. It was the wish of many of those who then took an interest in the movement, to accomplish the necessary objects in connection with the Chemical Society, and at a public meeting held at the Chemical Society's Rooms in Burlington House, on the 27th of April, 1876, a Committee was appointed to confer with the Council of that Society on the subject. The meeting was adjourned to the 4th of November, 1876, when the following report of the Committee was read:—

**“REPORT OF COMMITTEE APPOINTED TO
CONFER WITH THE COUNCIL OF THE
CHEMICAL SOCIETY.**

“Your Committee commenced their duties on May 1st, and drew up a scheme for the consideration of the Council of the Chemical Society, the distinguishing features of this scheme being that the new organisation should be designated as the “Institute of Professional Chemists,” and that it should be affiliated to the Chemical Society as a separate and independent branch. On May 8th, your Committee submitted their views to

the Council of the Chemical Society, who forthwith appointed a Sub-Committee to consider the matter. In turn this Sub-Committee drew up a plan for carrying out some of the essential points of the desired organisation through the instrumentality of the Chemical Society. This plan was finally adopted, with certain minor modifications, by the Council, and communicated to your Committee. It differed from the scheme suggested to the Council by your Committee in some respects, and chiefly in that it simply provided for a new class of Fellows of the Chemical Society, to be entitled 'Practising Fellows of the Chemical Society.'

"While approving in general terms of many of the propositions thus submitted, your Committee concluded, after due deliberation, that grave objections existed to this scheme. First, on consulting Counsel, adverse opinions were given as to the legality of the proposed alterations in the Fellowship of the Chemical Society; and there appeared in consequence to be a strong probability that on this account alone the whole suggestion would have to be abandoned. Next, there appeared to be some doubt whether the proposals of the Council would meet with the entire approval of the Fellows of the Chemical Society assembled at a General Meeting; and further it was thought that the title, 'Practising Fellows of the Chemical Society,' was open to various objections. For these and other reasons, your Committee wished to know if the Council of the Chemical Society would sanction the new class of Fellows being called 'Fellows of the Chemical Institute of the

Chemical Society,' *i.e.*, that a sub-section of the Society, to be termed the Chemical Institute of the Chemical Society, should be formed. The Council, after again taking Counsel's opinion upon the matter were of opinion that such a change would be undesirable.

"Your Committee having finally become convinced that the successful carrying out of a thorough plan for the organisation of the Chemical Profession through the agency of the Chemical Society would be attended with great difficulty, even if it should not prove to be wholly impracticable, turned its attention to other schemes, and now begs to offer suggestions for the formation of a new and independent body, which will, it is thought, completely fulfil all the desired ends. The outline plan now put forward has not been arrived at without much deliberation as to the relative advantages of several other schemes proposed by different advocates of organisation, and in point of fact, it embodies many of their best suggestions."

It was then resolved, first: "That the cordial thanks of the meeting be tendered to the President and Council of the Chemical Society for the consideration given by them to the proposals of the Organisation Committee, and for the efforts made by them to meet the views of the Committee in relation to these proposals;" and secondly, "that having regard to the limited powers of the Chemical Society under its Charter, it is desirable that an association be formed that shall be independent of the Chemical Society, and that the Organisation Committee already formed be dissolved,

and that a new Committee be formed to settle the form and details of the scheme, and to take all steps necessary to secure the formation and incorporation of the proposed new Association."

At a meeting of this new Committee, held at Burlington House, on the 25th day of November, 1876, a Sub-Committee, consisting of Professor Abel, Mr. Carteighe, Professor Frankland, Mr. W. N. Hartley, Mr. Neison, Dr. Voelcker, and Dr. C. R. A. Wright, was appointed to draw up the details of a scheme for the contemplated organisation. This Sub-Committee held seven meetings, and spent much time and labour in the elaboration of a plan embodying, as far as possible, the views which had been expressed at the public and Committee meetings. They laid this draft scheme before the Organisation Committee on the 24th of February, 1877, when the Sub-Committee was re-appointed and instructed to take all necessary steps for the incorporation of an Institute of Professional Chemists of Great Britain and Ireland, based upon the scheme then submitted. At this meeting the names of forty-eight Chemists were added to those of the Committee as First Fellows of the Institute, and the Officers and Council of the Institute were elected. There was also a request made to the Sub-Committee to present an additional list of Fellows for election at the first meeting of the Council of the Institute.

The Sub-Committee then instructed our Solicitor, Mr. Pettengill, to draw up the necessary Memorandum and Articles of Association in conformity with the

scheme decided upon, and to make application to the Board of Trade for incorporation.

It was here that our real difficulties began, and we learnt, to our astonishment, that the promoters of this movement were not, in the eye of the law, Chemists at all, either professional or otherwise.

The status of the modern Chemist has been defined by an eminent novelist, Mr. Wilkie Collins, in the following words: "It is lucky for society that modern Chemists are, by incomprehensible good fortune, the most harmless of mankind. The mass are worthy fathers of families, who keep shops. The few are philosophers besotted with admiration for the sound of their own lecturing voices; visionaries who waste their lives on fantastic impossibilities, or quacks whose ambition soars no higher than our corns. Thus society escapes; and the illimitable power of Chemistry remains the slave of the most superficial and the most insignificant ends."

This definition, so flattering to Chemistry, so derogatory to the Chemist, was doubtless considered by other readers besides myself, as a mere use of that licence of the imagination which led Charles Dickens to make an end of Krook by spontaneous combustion, and George Eliot to announce to Adam Bede the drowning of his father in a stream overhung with willows, by the tapping of a willow wand upon his door at midnight.

Certainly the Chemists who smiled at Count Fosco's grotesque idea, never imagined that such an opinion of their aims and occupations could be seriously entertained, and still less that it would be made, by a department of Her Majesty's Government, an insurmountable

obstacle to an organisation for "ensuring that Chemists shall be duly qualified by study and training for the proper discharge of the duties they undertake."

The following correspondence with the Board of Trade shows that I am neither exaggerating nor misrepresenting either the views entertained by that Department respecting the position and occupations of Chemists, or the action taken by the Board, whereby we are prohibited from calling ourselves Chemists, and from certifying in any case that a member of our body is competent to perform chemical operations. The first letter I shall read was written in answer to our Solicitor's application for incorporation.

BOARD OF TRADE (RAILWAY DEPARTMENT.)

LONDON, S.W.

May 26th, 1877.

SIR,—Referring to your application to this Department on the part of the Institute of Professional Chemists of Great Britain and Ireland, for a license under the 23rd Section of the Companies' Act, 1867, I am directed by the Board of Trade to transmit to you herewith a copy of a communication they have received from the Privy Council Office conveying the views held by the Pharmaceutical Society in the matter of your application.

I am to express the hope of this Board that the promoters of this Institute may see their way to some modification of the scheme which would meet the objections of the Pharmaceutical Society, as the Board of Trade would not feel themselves justified in issuing their license until such objections are removed.

I am, sir, your obedient Servant,

HENRY G. CALCRAFT.

J. PETTENGILL, Esq.,
32, Walbrook, E.C.

The communication from the Privy Council Office is based upon the following letter from the Secretary of the Pharmaceutical Society.

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.

17, Bloomsbury Square, London, W.C.

18th May, 1877.

SIR,—I have the honour to acknowledge the receipt of your letter dated the 9th inst., transmitting for such observations as this Society may have to make, the Memorandum and Articles of Association of the Institute of Professional Chemists of Great Britain and Ireland.

The President and Council of this Society have instructed me to express to His Grace the Lord President of the Council, the thanks of this Society for the favour of your communication, and in accordance with the opportunity thereby given, to convey the following observations.

This Society having been (as its Royal Charter of Incorporation says), formed for the purpose of advancing Chemistry and Pharmacy and (as the Pharmacy Act says) been so formed by persons desirous of advancing Chemistry and Pharmacy has so continued, and in order that persons exercising the business or calling of Pharmaceutical Chemists in Great Britain should possess a competent practical knowledge of Pharmaceutical and General Chemistry, the Council have, as required by Section 8 of the Pharmacy Act, appointed a Board of Examiners who, in accordance with that Act and the Pharmacy Act, 1868, have conducted (since 1868, in the presence of an officer appointed by the Privy Council) examinations in Pharmaceutical and General Chemistry, those examinations consisting of the major and the minor, as defined by No. 12 of Sec. 10 of the Bye-Laws approved by the Privy Council on the 6th February, 1869, and the examined persons being registered, those who have passed the major as Pharmaceutical Chemists, and those who have passed the minor as Chemists and Druggists. The Council of this Society therefore cannot adopt the more limited account of the objects and operations of this Society expressed in the second and third Clauses of the letter

of Mr. Pettengill, nor a later sentence in the same letter purporting that there is not any guarantee at present afforded to the public or the Courts of Law of the competency of persons called as experts in Chemical Science nor simple means by which persons having recourse to chemists can prove their training and fitness for the skilful performance of the work they undertake.

As above mentioned, this Society having been formed for advancing Chemistry, and the Members of the Council being persons desirous of advancing that science, this Society would encourage rather than discourage any movement calculated to advance Chemistry, and they would regard with much respect an Association formed of the eminent gentlemen whose names appear in the 40th Clause of the Articles of Association; but at the same time they fail to recognise any public need of a new examining body, and entertain grave doubts whether in fact the beneficial results of the power conferred upon this Society by the Royal Charter and Statutes above mentioned will not be imperilled by an addition to the examinations and certificates in Chemistry now recognised.

It would appear that the Institute proposed is not intended only for Association, the Clauses 57, 70, 71, and 72 in the Articles point to examinations and to the granting of sundry certificates to the Members as well as to the examined persons.

The consideration whether the public will discriminate between Chemists holding various certificates would appear to be material; it cannot be said that the distinction between Pharmaceutical Chemists and Chemists and Druggists is universally understood, and on the whole the Council of this Society would express the hope that Chemistry and the Association of Chemists may be advanced without the addition of any new examining body or grade of examined persons.

It may also be suggested that the phrase "Professional Chemist" is indefinite and liable to convey an erroneous impression. All persons who have studied and may practice the science of Chemistry, whether as applied to Pharmacy, Agriculture, or any other special object, may claim to be professional Chemists, and a more distinctive title than the one proposed is desirable.

Science is in various departments advanced by Associations which do not examine or grant certificates. The Royal Society, the Society of Arts, the Linnean Society, and the Chemical Society may be named as examples, and the Council of this Society would see no reason to discourage an Association in regard to Chemistry which did not contemplate the granting of Certificates.

I have, &c.

(Signed)

ELIAS BREMRIDGE,

Secretary and Registrar.

C. L. PEEL, Esq.,

Privy Council Office.

In consequence of this communication from the Board of Trade, your Council consented, in deference to the wishes of the Council of the Pharmaceutical Society, to change our title from "The Institute of Professional Chemists of Great Britain and Ireland," to "The Institute of Chemistry of Great Britain and Ireland," and resolved to insert the following words in the Memorandum of Association: "That no Fellow or Associate be entitled to a Certificate of his Fellowship or Associateship."

The opposition of the Pharmaceutical Society was then formally withdrawn; nevertheless, the incorporation of the Institute was still withheld, and our Solicitor subsequently received a communication from the Solicitor to the Board of Trade, requesting that the Sub-section *b* of Section 3 of the Memorandum of Association should be struck out. The Sub-section described one of the objects of the Association to be:

"To ensure that Consulting Chemists and Analytical Chemists are qualified by study and training for the proper discharge of the duties they undertake."

After an interview with the Solicitor to the Board of Trade the matter was referred back to their Counsel; with a request for a statement of the grounds upon which the omission of the paragraph was asked for. The following letter of explanation was subsequently received by our Solicitor:—

BOARD OF TRADE (RAILWAY DEPARTMENT.)

LONDON, S.W.

2nd July, 1877.

SIR,—With reference to your interview with me this afternoon relative to the omission of Sub-section *b* of Section 3 of the Draft Memorandum of Association of the proposed Institute of Chemistry, I am directed by the Board of Trade to inform you that in accordance with your wish, I have communicated with Counsel on the subject.

I am now to inform you that the Sub-section was struck out on two grounds:—

- "(1.) Because it appeared to point to the granting of Certificates and to nothing else.
- "(2.) Because it appeared to cast a doubt on the fitness of the Pharmaceutical Society to perform their duties—inasmuch as it is the duty of the Pharmaceutical Society to see that Consulting Chemists are duly qualified, and the fitness of the Society to perform that duty has been recognised by the State, and this being so, further *security* for the qualifications of Chemists does not appear to be needed."

As regards the fear which you expressed that the omission of the Sub-section might be fatal to the promotion of the Institute, I am to add that it appears to this Department to be at least doubtful whether the words "to ensure that Consulting Chemists and Analytical Chemists are duly qualified," are required for anything (other than the grant of Certificates) which the promoters cannot do under the remaining part of the Memorandum.

I am, Sir, your obedient Servant,

HENRY E. CALCRAFT.

J. PETTENGILL, Esq.,
32, Walbrook.

It was of no avail to explain to the Board of Trade that Membership of the Institute of Chemistry would confer no right to keep a druggist's shop, or to interfere with trade in any way, and that the titles "Chemist and Druggist" and "Pharmaceutical Chemist" have always been exclusively applied to persons keeping shops for the sale of drugs, whereas the terms "Chemist," "Analytical Chemist," and "Professional Chemist" have always been applied to persons specially trained in the science of Chemistry.

In adhering to their views on this matter, the officials of the Board of Trade no doubt took their stand upon an Act of Parliament which declares that a Chemist, however eminent in his profession, shall not, under a penalty of £5 for each offence, describe himself as such, unless he be duly registered as a Chemist and Druggist, or a Pharmaceutical Chemist.

The Pharmacy Act of 1868 enacts that "on and after the 31st day of December, 1868, any person who shall take, use, or exhibit the name or title of 'Chemist' not being a duly registered 'Pharmaceutical Chemist' or 'Chemist and Druggist,' shall for every such offence, be liable to pay a penalty or sum of £5." The President of the Chemical Society, for instance, could not, in a Court of Justice or elsewhere, use the designation by which he is known all over the civilized world, without thus infringing the laws of his own country.

The development of the Pharmaceutical Society from its first foundation is within the range of my own experience, and I estimate very highly the advantages which it has conferred upon Pharmaceutical Chemists. Through the instrumentality of its excellent laboratory, and its prescribed course of general education, it has greatly raised the status of the Druggist, and has conferred dignity upon a most important occupation which, before the incorporation of the Society, was too often carried on by Grocers, Oilmen, and others entirely ignorant of the properties of drugs. But I think that the Pharmaceutical Society overstepped the limits of strict justice when, in 1868, it laid exclusive claim to a title which is the common property of all who cultivate the Science of Chemistry.

Time has condoned the malappropriation of the title of the Physicist and that of the Druggist (which ought to be "Apothecary") by the Medical Profession, but this sequestration of the universally known title or

designation of "Chemist" is not yet 10 years old, and I am at a loss to conceive how it can be defended.

The Organisation Sub-Committee had thus two alternatives. They had to choose either the acceptance of the condition of registration imposed by the Board of Trade, or the establishment of the Institute as a private society. They decided upon the former alternative, and agreed to the removal of the obnoxious sub-section, provided that the next following sub-section were made to read thus:—"To adopt such measures as may be necessary for the advancement of the profession of Chemistry, and particularly for the maintenance of the profession of the Consulting and Analytical Chemist on a sound and satisfactory basis."

The amended statements of the objects of the Institute are still sufficiently comprehensive to enable your Council to do all that is essential to the carrying out of the original intentions of its founders. They enable us to appoint and remunerate examiners, to insist upon a high standard of qualification for admission to Associateship and Fellowship, such for instance as a sufficient preliminary general education and special training, the passing of satisfactory examinations in general Chemistry, in the practical qualitative and quantitative analysis of minerals, organic compounds and gases, in Physics, and in Mathematics, and a subsequent three years course of study and practical work in applied Chemistry. These qualifications will serve to distinguish Fellowship of the Institute of Chemistry from Fellowship or Membership of any other body whatever in this country. Thus the

Royal Society and the Scientific Societies generally never submit their Candidates to any special test of competency, and Fellowship of these Societies does not even profess to afford any guarantee of proficiency.

The taking of a medical degree requires only a very limited knowledge of Theoretical Chemistry, affords no testimony to the competency of the possessor to perform more than the very simplest operations of practical Chemistry, and constitutes no guarantee that even an examinee in honours possesses that knowledge which is absolutely necessary for the efficient practice of professional Chemistry. Again, the major examination of the Pharmaceutical Society, so far from justifying the opinion of the Solicitor to the Board of Trade, that "further security for the qualification of Chemists does not appear to be needed," involves only the merest elementary knowledge of Physics and Arithmetic, and prescribes only the following practical knowledge of Chemistry:—

"The nature and properties of the elements and their compounds, both organic and inorganic, especially those used in medicine or the arts. Also the *qualitative* analysis of the most important Chemicals, such as Nitrates, Chlorides, Carbonates, Sulphates, Phosphates, Oxalates, Tartrates, &c., and the detection of impurities in them, and the *volumetric* estimation of the *strength* of all Pharmacopœia preparations in which standard solutions are ordered to be used."

It is superfluous to remark that this examination, which even stops short of every species of gravimetric

quantitative analysis, tests only the simplest elements of that thorough knowledge which the Institute proposes to require of its Candidates. Such an examination, even if passed in the most satisfactory manner, though well enough adapted for testing the qualifications of a Pharmaceutist, affords no security whatever that the examinee is competent to undertake the duties of a Public Analyst, to give advice in the applications of Chemistry to the Arts, Agriculture, and Public Health, or to make investigations in connection with the applications of Chemistry to Technical Industry. Neither does the 3 years practical work in a Druggist's Shop, prescribed for the young Pharmaceutist, afford any preparation for the performance of these various duties. The highest Chemical and other training required by any existing profession or scientific society, is therefore entirely inadequate as a guarantee of competency such as we hope to establish.

Interests of enormous value are frequently placed in the hands of Professional Chemists, and it is therefore highly important, both for the benefit of the public, and the credit of the profession, that such Chemists should be properly educated and trained for their functions. What has hitherto been left to individual effort, it will now be the object of the Institute of Chemistry to foster and secure.

I mentioned at the outset of these remarks that much laborious self-sacrifice was demanded by this movement, and that it had been most willingly given by many eminent colleagues. Where all worked so cordially in

devising a practical scheme, and in overcoming the many difficulties which beset the incorporation of our Institute, it is perhaps invidious to mention names, but I feel sure that all his fellow-workers will agree with me, that our best thanks are due to our late Honorary Secretary, Mr. Walter Noel Hartley, for the efficient manner in which he discharged the exceptionally heavy duties necessarily falling upon him, and which were continued down to the date of incorporation.

The means which it is proposed to employ, and the progress already made, for the attainment of the objects of the Institute, you will learn from the Report of your Council which I will now ask the Secretary to read.

REPORT OF COUNCIL.

REPORT OF COUNCIL.

THE most important business which your Council has transacted since the Incorporation of the Institute has necessarily been the development of the organisation, by providing, as far as possible, for the admission of all competent Chemists into the Association.

In order to form a nucleus for the Institute, it was deemed advisable, in the first place, to invite all those Chemists of standing in the profession who were well known to Members of Council, either personally or by repute, and with this object your Council, at their first meeting,—after formally electing as Fellows those Members of the Organisation Committee who were not on the Council,—instructed the Secretary to issue invitations to the most prominent members of the profession (whose names had been selected by a committee appointed for that purpose) asking them to join the Institute. It is very likely, however, that the names of some few gentlemen were accidentally omitted from the list, although the Council endeavoured to make it as complete as possible.

A committee was then appointed to examine into the qualifications of candidates for admission to the Institute; not only of those who made personal application through the Secretary, but also of those who were proposed by Members of Council. At the same time advertisements were inserted in *The Times*, *The Chemical*

News, and *Nature*, announcing that the time for admission of original Fellows and Associates would expire on the 2nd of February, 1878. A large number of applications (over 150) were made, asking for information as to the means of obtaining admission to the Institute, and of these 93 have already become candidates for the Fellowship or Associateship, and sent in formal applications accompanied by certificates.

The Nominations Committee has carefully considered the qualifications of the several candidates, requiring as a rule that they should be those expressed in Articles 56 and 60—namely, for a Fellow: 1. That he is not less than twenty-four years of age. 2. That he has passed through a course of three years training to the satisfaction of the Council, in Theoretical and Analytical Chemistry and Physics, and has subsequently been engaged for three years either as Assistant to a Chemist of repute, or as a Professor or Demonstrator of Practical Chemistry at some known University, College or Medical School, or as a Chemist in a technical industry, or has, after three years training as above, conducted and published an original research of sufficient merit, in the opinion of the Council, on some Chemical subject necessitating practical work: or 3. That he has been trained or occupied in other ways, which, in the opinion of the Council, are equivalent to fulfilling the conditions stated in the preceding Article.

For an Associate: 1. That he is not less than twenty-one years of age. 2. That he has passed through a course of three years study of Theoretical and Analytical Chemistry, Physics, and Elementary Mathematics, satisfactory to the Council. In very few instances only has the Council found it necessary to depart from this rule.

Where candidates were not actually proposed by Members of the Council, they were required to produce certificates or other documentary evidence, that their statements as to their training and subsequent Chemical career were substantially correct.

In the case of Associates, such was the satisfactory character of

their training and experience, that many of them might advance a valid claim to be admitted as Fellows if they were not disqualified by being under the age of twenty-four. All of them possess the qualification specified in Article 60. (2). Of having passed through a course of three years study of Theoretical and Analytical Chemistry, Physics, and Elementary Mathematics.

The objects of the Institute have been favourably regarded by almost all who have been invited to join, and even those, who from one cause or other felt unable to take up the Fellowship have, with one or two exceptions, expressed sympathy with the objects of the Institute, and wished it every success. Of the Chemists invited to join at the first Council meeting, 153 have already accepted the Fellowship.

Since the first Council meeting 160 more Fellows and 43 Associates, proposed by Members of Council, or who have made personal application, have been elected, and of these 79 (72 Fellows and 7 Associates) have accepted: as, however, only a short time has elapsed since the election of the greater number of these gentlemen no accurate estimate can be made of how many will eventually join; although considering that nearly all have applied for admission to the Institute, either directly, or through some Member of the Council, in all probability there are but few of them who will not become either Fellows or Associates. At present 225 Fellows have joined the Institute, and 142 have been elected but not yet formally admitted.

Your Council is of opinion that a high standard of education and training should be fixed as a necessary qualification for admission to the Associateship, not only in Theoretical and Practical Chemistry, but also in the subsidiary subjects of Physics and Elementary Mathematics, and that such a standard can only be maintained by a carefully arranged system of examinations. A committee has, therefore, been appointed for the purpose of drawing up a complete examination scheme, and will in a short time report to the Council on the best method of attaining these objects.

The Council intend to publish as early as possible, a complete list of the Fellows and Associates of the Institute.

It is with the greatest pleasure that your Council announces that Dr. Frankland has offered two prizes of £50 each, to be awarded by the Council of the Institute, and announced at the next General Annual Meeting, for the two best original investigations involving Gas Analysis, and conducted by Associates of the Institute.

In conclusion, the Council desire to express their thanks to the President and Council of the Chemical Society for the use of their rooms on this and many previous occasions.

THE TREASURER IN ACCOUNT WITH THE INSTITUTE OF CHEMISTRY OF GREAT BRITAIN AND IRELAND.

Balance Sheet up to December, 31, 1877.

Dr.		Cr.	
	£ s. d.		£ s. d.
To 92 Members' Admission Fees ...	193 4 0	By Paid to W. N. Hartley, Esq., for Postage, Printing, &c.	23 17 0
" 79 " Subscriptions for 1878 ...	165 18 0	" Ditto, Dr. Alder Wright...	3 0 0
" 8 " Life Subscriptions ...	168 0 0	" Petty Cash Disbursements—	26 17 0
" 2 Associates' Subscriptions for 1878	2 2 0	Postage & Receipt Stamps	0 10 0
		Charges on Country Cheques	0 1 7
		Cheque Book ...	0 8 4
		Balance. Cash in hands of	0 19 11
		Treasurer ...	13 1 5
		Ditto in London and West-	
		minster Bank ...	488 5 8
			501 7 1
			£529 4 0

Audited and found Correct
JAN. 29TH, 1878.

CHARLES GRAHAM,
JOHN M. THOMSON,
FREDERIC JAS. M. PAGE.

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

R E P O R T

OF A
CONFERENCE ON TRADE CERTIFICATES,
TOGETHER WITH
THE REPORT OF THE COUNCIL
AND
BALANCE SHEET FOR 1878.

London :
PRINTED BY A. P. BLUNDELL & Co., 26, GARLICK HILL, E.C.

1879.

INSTITUTE OF CHEMISTRY.

CONFERENCE

ON

TRADE CERTIFICATES,

Held Friday, November 22nd, 1878.

THE PRESIDENT said : In resolving to hold a series of Conferences of the Fellows and Associates, to discuss subjects connected with professional politics and ethics, your Council felt that there are many matters arising out of the practice of the Profession of Chemistry which are not suitable for treatment before Societies exclusively occupied with the progress of scientific investigation, but which are nevertheless of great interest and importance to our members. It was thought, therefore, that in promoting the consideration of these subjects we should be occupying fresh ground, and should not be unnecessarily creating a new field of discussion.

The professional chemist, both young and old, is frequently placed in positions of difficulty, calling for prompt and decisive action. He has, perhaps, no friend at hand to consult, and no precedent to guide him. Under such circumstances, a knowledge of the general principles adopted by a large number of his colleagues in similar cases would be invaluable to him. It would help him to decide upon a judicious course of action, and to insist firmly upon conditions for which he had the moral support of his brethren. Without any formal code of ethics, it is believed that the free discussion of such topics amongst ourselves will form a sound basis of opinion, tending to produce as much uniformity of practice as is desirable in a profession which, like ours, deals with such a wide range of subjects and such a great variety of clients.

Your Council considers it very undesirable that any formal resolutions should be adopted, or even any rules or regulations drawn up for the guidance of the profession. In the present stage of our development, there is no such sufficient knowledge of details as would justify us in imposing any restrictions upon individual liberty in chemical practice, other than that moral support and restraint which will necessarily be engendered by the expression of opinion at these Conferences.

The subject selected for discussion this evening is "Trade Certificates," and it will perhaps be convenient, in the first instance, to attempt some definition of the subject. It seems to me that any expression of opinion as to the quality or value of anything which is bought and sold is a trade certificate. This definition may seem to some to be too wide; but it will probably be best, in the first instance, that the basis of discussion be made as broad as possible.

The certificates coming under this definition may be divided into two categories:—

I. Opinions or reports made to disinterested parties.

II. Opinions or reports made to interested parties.

To the first category obviously belong, 1stly, Reports made to Governments; and, 2ndly, to Corporations, Local Boards of Health, Companies, and private individuals, who are only interested in the truthfulness and trustworthiness of the opinion, and not directly in the value of the article or process reported upon.

The second category comprises all those cases in which the client is directly interested in the bias of the opinion being either in favour of or against the article or process reported upon.

In regard to the first category, the professional chemist rarely experiences any difficulty. He pursues his inquiry quite unfettered; he is permitted and sometimes admonished to look impartially at both sides of the question; and he experiences nothing of the unpleasant feeling that his report will be unwelcome, unless his experiments lead to a foregone conclusion. I have not much to say about these opinions or reports, except to warn the reporter

to be on his guard against expressions susceptible of unfair use by persons directly interested in the article or process reported upon. The fair use, by interested persons, of such of these reports, or portions of them as are published is, in my opinion, unobjectionable; but in any quotation, the date of the report and other necessary description should be given; and I think that the reporter is morally bound in the interest of the profession, to employ his best endeavours to prevent any misuse of his report, and to publicly expose, if he cannot prevent, such misuse.

A flagrant abuse of this kind has recently come within the range of my own experience. In connection with certain experiments on the purification of drinking water by permanganate of potash and by filtration through animal charcoal, I wrote during the cholera epidemic of 1866, to the Registrar-General, as follows:—"When I state that permanganate is the only purifier in which I should have faith, I have regard to what is practicable in the present emergency; for, if its use were practicable, I should prefer filtration through animal charcoal, which, as you will see by my three recent reports, *removes practically all organic matter*." After a lapse of twelve years, the sentence, "removes practically all organic matter", is dug out to adorn an advertisement in the *Sheffield Daily Telegraph*, which came under my notice in September:—

7s. 6d. EACH AND UPWARDS.

PURE CARBON WATER FILTERS.

WITH SILVER PLATED TAPS. GUARANTEED EFFICIENCY.

OPINIONS OF SCIENTIFIC MEN.

"Removes practically the whole of the organic matter."

Professor FRANKLAND, F.R.L.S.,

South Kensington Laboratory, London.

I immediately wrote to the Editor the following letter:—

PURE CARBON WATER FILTERS.

TO THE EDITOR OF THE SHEFFIELD DAILY TELEGRAPH.

SIR,—My attention has been called to an advertisement which appears in your columns, and in which I am represented as having written that pure

carbon water filters remove practically the whole of the organic matter from water. Will you kindly allow me space to say that until I read the advertisement I never heard of these filters; and that, so far as my chemical knowledge extends, "pure carbon" is practically useless for the purification of water.—I am, sir, yours truly,

E. FRANKLAND.

Royal College of Chemistry, South Kensington Museum,
September 14th, 1878.

A repudiation of this kind is much more efficient as a warning to others if an unfavourable opinion of the article can be expressed in it—hence the addendum about the uselessness of *pure* carbon.

Our debate this evening will, however, probably be chiefly occupied with the second category of certificates; for it is these which most frequently place the chemist in an unpleasant position, not unfrequently throwing discredit upon him, or even upon the whole profession. Indeed, so much odium has attached itself to these certificates, and so great is the difficulty of preventing their misuse, that many chemists, myself amongst the number, practically decline to have anything to do with them. This method of obviating the difficulty is very easy and convenient, but I must confess that it seems to me somewhat pusillanimous. It is perfectly legitimate and natural that a buyer or seller of an article or process should apply to an expert for information as to its value, and there must surely be some mode by which the expert can express an opinion which shall not be easily liable either to misinterpretation or abuse, and which shall guide, not mislead, the more intelligent portion of the public. It is, perhaps, too much to hope that the less intelligent section of the public will not be misled by the adroit use of even the clearest and most conscientious report that could be written; but it would obviously be unfair to lay the blame upon the reporter in such cases.

In giving certificates of this class, the chemist is often placed in a difficult and delicate position, and it needs the greatest caution and watchfulness on his part to prevent his opinion from being biased by eager and perhaps unscrupulous clients. He will find his greatest safeguards to be trustworthy methods of analysis, a close adherence to experimental facts, and an unswerving rectitude in the expression of his opinion. If he goes at all outside the

circle of his facts and experience, he should tread with extreme caution, and should retreat within that circle again as soon as possible. There are few things more harassing to a professional man than a rash and ill-considered opinion. It may dog his steps for the rest of his life, and he may be certain that it will be turned up against him at the most inconvenient moments.

If the opinion is expressed upon an analytical result, he ought to describe the sample analysed, and how it came into his possession, and he ought to make his opinion refer to that sample only. With all his care, however, he will probably not always escape having his certificates applied to articles he has never examined. A case of this kind has just occurred to myself.

In May, 1877, I analysed a block of Norwegian ice sent to me by a large ice merchant. The water contained less than $\cdot 5$ part of solid residue in 100,000 parts, $\cdot 029$ org. C., $\cdot 005$ of org. N., and only $\cdot 05$ of Cl., in fact, it was considerably purer than ordinary distilled water. I reported as follows: "The block of ice is exceedingly pure, and the water obtained from it is clear and palatable, and contains less foreign matters than any water with which I am acquainted in this country." Of course the ice merchant published this report, and then other merchants who got their ice from Norway seemed to consider my opinion to be common property, and proceeded to attach it to their advertisements, greatly to the annoyance of the original ice merchant for whom the analysis was made. He sent me the advertisements, and thus enabled me to stop them by disclaimers. One enterprising merchant applied my report to a cargo of ice which was *expected* to arrive shortly.

Another point upon which the analyst cannot too strongly insist is that in any publication, the date of the report should always be attached. However conscientious an opinion may be, and however carefully it may be expressed, there must, in all but extremely rare cases, be a limit to the time during which it can be applicable to the article reported upon. Coal from the same mine, guano from the same island, and beer from the same brewery, necessarily vary in quality from time to time, and it is

obviously most unfair, both to the public and to the analyst, that, by the concealment of dates, a report, made perhaps years ago, should be applied to an article which may be of very different quality from that originally examined. I have also a recent case of this abuse which has occurred to me, and occasioned me a good deal of unpleasant correspondence. About twenty years ago I was requested by a firm of mineral water manufacturers to instruct them how to make artificial seltzer water approaching the natural water, as nearly as possible, in composition. I analysed natural and Brighton Seltzer Water, and gave them a formula from which they manufactured an article which I reported to them to be "fully equal to the best German Seltzer Water, while its effervescent qualities rendered it much more agreeable to the palate." I heard nothing more of this water until August last, when my attention was drawn to an advertisement in the *Daily News*, in which the above quotation appeared, signed, "E. Frankland, Ph.D., F.R.S., D.C.S., &c., President of the Institute of Chemistry of Great Britain and Ireland." I immediately wrote to the editor as follows:—

MINERAL WATERS.

TO THE EDITOR OF THE DAILY NEWS.

SIR,—Under the above heading there appeared in your impression of the 12th inst. an advertisement quoting a certificate of quality, purporting to be from me. As I have no recollection of ever having given such a certificate, and have certainly not done so during the last fifteen years, I will thank you to insert this disclaimer.—I am, Sir, yours truly,

Royal College of Chemistry,
August 14th.

E. FRANKLAND,

A somewhat angry private correspondence ensued, but I succeeded in suppressing the testimonial in all subsequent advertisements, if I did not convince the advertisers that they were misleading the public, at all events by the withholding of the date of my report, as well as by the insertion, after my name, of a title which I had scarcely possessed for a year. It does not seem difficult, therefore, to suppress such abuses of certificates; but I would suggest that, in some cases at least, the maximum length of time during which a certificate should run might be agreed upon when

it is given. I am, however, occupying too much of your time, when there are many other members present who have had much more experience than I in this matter, and I will only say, in conclusion, that, as the subject is a very important one, I trust we shall have a full, confidential, and temperate discussion, in which I would invite the co-operation, not only of those of our Members who are themselves in the habit of giving testimonials, but also of others, who will look upon the subject from a more neutral point of view.

DR. VOELCKER said it was very plain that certificates should state that they only referred to the particular sample analysed, and in that case it was a useful restraint on the seller of the article, as he tacitly guaranteed that his goods should be of the same quality as the sample examined: for example, in a super-phosphate, that the article he sells shall contain the same amount of soluble phosphoric acid as the original sample. In such cases a chemical certificate was perfectly legitimate, but there were other instances in which certificates were given in which the constituents which can be determined accurately by analysis had comparatively little to do with its value; in a wine, for instance, it is not so much the amount of alcohol, sugar, tannin, &c., that affects its quality and determines its money value, as aroma, age and similar conditions, which cannot be ascertained by analysis. When a chemist certifies that he has carefully examined a sample of port or sherry sent, and finds it perfectly sound and of excellent quality, you doubt whether he has expended much chemical skill on it. The speaker then related a case in which a friend of his, the Secretary of an Agricultural Society in Virginia, had sent him a packet of particularly choice tobacco, and he had, out of curiosity, analysed it, and, the results differing somewhat from those of ordinary tobacco, particularly in the small quantity of nicotine it contained, he had sent an account of the analysis to his friend. Somehow or other, an enterprising tobacco merchant had got hold of the analysis, and appended it to his circular, as if Dr. Voelcker had certified to the value of the tobacco sold by him. Fortunately, this was discovered, and the circulars were destroyed. The

speaker warned the younger members against the wiles of commercial men in obtaining certificates from chemists, which might be put to a very different use from what they expected.

DR. DUPRÉ said that he had no personal experience in regard to certificates, as he had always refused to give them. In his opinion nothing reflected so much discredit on chemists as the system of certificate giving. He, of course, did not look upon a report giving merely the results of an analysis or such other particulars only as directly follow from the analysis, in the light of a certificate, if not intended for publication. But even here great care should be taken to connect the analysis clearly and unmistakably with the particular sample analysed. There was, in his opinion, one way, and one way only, in which a chemist could help to insure the public against the issue of spurious or inferior articles, namely, by analysing every lot separately manufactured; or, in the case of a natural article liable to variation, every special lot, and attaching his signature, as a guaranty, to every lot sold. This is, for example, the case with the Liebig's Extract of Meat; a sample of every lot imported is analysed, and the signature of the analyst is attached to each jar sold.

DR. ALDER WRIGHT said that when he was called upon to analyse substances, the report on which might possibly be used as a trade circular or advertisement, he was in the habit of obtaining from the sender a guarantee that the report, if published at all, should be published entire without omissions or elisions, and especially that isolated sentences should not be selected for publication, for it was a common practice with advertisers to take out from a chemist's report some remark as to the properties or character of the substance, and publish that only, without the context, which often greatly qualified the remark, thereby making it appear that the chemist stated something quite different from the general tenor of his report. He considered that in the case of numerous instances of every day use, a chemist was perfectly justified in giving for publication an analysis of a sample (taken, when practicable, by himself), and an opinion as to its relative quality, provided, firstly, that he guarded against his certificate

being published in a garbled or misleading form, and, secondly, that he so worded the certificate as to show clearly that it only related to the particular sample examined, and how that sample was obtained. For example, in the case of a parcel of tea, or some such article of food, he would state in his certificate that, having received a sample of tea marked so and so (or having taken a sample from such and such a consignment), and having carefully examined it, he had not found therein any evidence of the presence of foreign matters, but would object to state (at least, in many cases) that the substance was “wholly unadulterated”, and would distinctly refuse to certify that “Messrs. So and So’s tea was free from all adulterations.” Or he would give for publication, as a circular or advertisement, a report on such a substance as an artificial fuel, a cement, &c., &c., comparing its chemical constituents and special properties with those of other similar articles in the market, when he was assured that his words would not be misquoted, and that, when he considered it necessary, the data on which his opinion was founded would be put before the reader to judge for himself; but would refuse to give a report simply stating that, “So and So’s Roman Cement was the best in the market,” or that, “Blank’s Artificial Fuel was superior to all others.”

PROFESSOR ATTFIELD agreed with Dr. Voelcker as to the moral effect of certificates, and thought that if analysts allowed their certificates to be published at all, they should insist on a statement that every parcel bearing the certificate was equal in quality to that analysed. There was danger in another direction than those already mentioned, that a chemist’s certificate might be made a means of imposing on the public. A sample, consisting of a mixture of two or more substances, quite pure, might be sent for analysis, and this mixture, with the certificate attached, might be sold under some fancy name at ten times its actual value. He had known a case where a mixture of substances, which might be bought separately anywhere for threepence or fourpence per pound, was sold under another name for about as many shillings. It was to the interest of traders as well as of themselves and the

public that great care should be exercised before allowing their reports to be published.

MR. DAVID HOWARD said, although he had no experience in granting certificates, he had rather a large experience in receiving them. There was one thing that should be borne in mind—that it was possible that a thing which was truly spoken might not be truly received: a certificate which was perfectly accurate in itself might convey a false impression to the public mind from the want of capacity in the public to understand a chemical certificate; for instance, they could understand if they were told that a certain water was wholesome, or that it was not wholesome; but a simple statement that it contained so many parts per million of ammonia, and so many parts of albumenoid ammonia, was perfectly unintelligible. There were many cases where certificates were of great value, as in new manufactures, new raw materials, &c., and a statement of the opinion of the chemist as to the probable use or uselessness of these often saved much trouble and loss. One source of error, against which chemists should be particularly on their guard, was not having a fair sample sent for examination. It was quite possible for a person, with the most honest intention, to take a sample which was not a fair one, simply from not having the dimmest idea how to do it.

MR. NEISON differed from Dr. Dupré, as he thought there were instances in which a published certificate was very useful to the public. For instance, if it were currently reported that mineral waters contained lead or arsenic, it would no doubt affect the consumption of mineral waters. The manufacturer of mineral waters goes to one chemist and learns that “He does not grant certificates,” he goes to another, and he insists upon his certificate, perhaps of great length, being published *in extenso*, if it is published at all. Now what the manufacturer wants is a short certificate that he can make use of in an advertisement, to let the public know that his mineral waters do not contain lead or arsenic, as the case may be, and that there is no foundation for the alarm. The speaker thought it would be a sufficient safeguard if the chemist were allowed to purchase the samples without the knowledge of the

manufacturer, and so satisfy himself that the manufactured product was free from danger.

DR. VOELCKER wished to add a word of caution in reference to what Mr. Neison had said. It was quite possible that a manufacturer, for trade purposes, might himself raise a scare, in order to take advantage of it. Suppose it is said that strychnine is extensively used in the brewing of bitter beer; some brewer takes care that this becomes very generally known, and he then gets his beer analysed by an eminent chemist or chemists, and makes use of this certificate to push the sale of his beer.

MR. FRISWELL said such cases as those mentioned by Dr. Voelcker were not at all uncommon. A certain aniline dye was brought out some years ago, which when used for articles of clothing worn next the skin, produced irritations and eruptions due to its chemical properties as a nitro derivative; it then became generally known that "roseine" contained arsenic, and it was said to be dangerous to use that dye in any shape, and the prejudice really and justly attaching to the nitro body, was popularly extended to all aniline dyes, in which form it often appears in the newspapers. A colour firm took advantage of this scare to advertise that they had a process for preparing rosaniline without the use of arsenic. As a matter of fact a process of this kind exists, but it is a failure as a manufacture. He had examined some samples of rosaniline said to have been prepared by this method, and found that they contained arsenic. Chemical analysis was often of great use in detecting frauds, as when exhausted dye-woods were dyed with aniline colours. He had recently heard from a friend in Japan, of an ingenious fraud of a somewhat similar kind attempted by the Japanese. Samples of red earth were sent from a village in the interior of Japan, and said to be used as a dye, but on examination, it was found that the sample of red earth sent had been ground up with crystals of hydrochloride of rosaniline, the fragments of which could be detected by microscopical examination.

MR. GROSJEAN referred to a case in which a chemist analysed a copper ore, and in his report gave the results and also his opinion, that the ore was of little value. To his astonishment, however, a

company was got up for working the mine whence this ore was obtained, and in the prospectus his analysis was given as "an analysis of the ore by the eminent chemist so-and-so," but his opinion was suppressed. He perfectly agreed with Mr. Howard as to the difficulty of sampling properly. Certificates often differed, simply because sellers would not consent to the articles being properly sub-divided. He had traced many differences in the analyses of tartar delivered to Mr. Lawes's factory to the fact that the samples were not taken in those cases from a ground mixture. He thought that tea would be a very difficult substance to sample, and he did not think, therefore, that the certificate of the analyst accompanying each packet of tea was always a true representation of the value of the contents.

PROFESSOR TUSON believed the best way, when asked to give a certificate, was to purchase samples of the substance to be analysed at times and places unknown to the client; to describe the samples, and state that the analysis refers only to those particular samples.

PROFESSOR REDWOOD said he thought there were many instances in which chemists were not only justified, but in which it was their duty to the public, to supply certificates, for the purpose of satisfying the public as to the composition or properties of articles, with reference to which a question might arise. All the speakers with the exception of Dr. Dupré, had expressed the opinion, that the issuing of certificates by professional chemists was allowable under certain restrictions, and some seemed to make the restrictions such as would tend greatly to limit them. He admitted that there should be restrictions to the use of certificates, especially with reference to their publication, but no uniform system of restrictions could, with advantage to all the parties interested, be adopted; for what would be suitable in one case might not be in others. This must be left to the judgment of the chemist, who had to protect his own reputation and the interests of his profession. With reference to the case of bitter beer which had been alluded to by Dr. Voelcker, he considered that the chemists whose certificates were then obtained were not only right in giving them and allowing them to be advertised, but that they would have been

decidedly wrong in refusing to do so. A great scare had taken possession of the public mind, and, whether well founded or not, the public had a right to look to professional chemists for the means of satisfying themselves as to the real facts of the case. Other similar cases have more recently occurred, as for instance, with reference to mineral waters, which were now so extensively used by the public, and which were sometimes said to contain lead to a sufficient extent to prove injurious to health. Then there was the quite recent case of violet powder, some samples of which had been found to contain arsenic; surely it was right to set the public mind at rest with reference to such cases, and who could do this but the professional chemist.

MR. TYLER said his own experience of certificates was confined to those which were sent into his firm's works, and there contracts were often made on the basis of analysis furnished by such reports. He had known, however, *bond fide* analyses surreptitiously used in a way which was not originally intended, and quoted a case of an analysis of a cattle food made many years ago in Dr. Hofmann's laboratory, although never published, being used on the markets for trade purposes. Unfortunately, methods of analysis were adopted with less regard for scientific accuracy than for the buyers or sellers' interests.

MR. GAHAN, speaking as an outsider, considered that certificates should be framed, as far as possible, with the object of informing the public, and were mainly valuable in proportion to the special knowledge of the chemist whose name was attached. As the value of the certificate in a great measure depended on this, he thought that the chemist should not simply state the composition, as suggested by Dr. Wright, but also give his opinion as to the value of the article for the particular purpose to which it was to be applied. He also suggested that it might be advisable for chemists to abstain from giving their opinion on matters upon which their professional knowledge in no way aided the judgment in coming to a correct conclusion.

MR. HELM considered that the certificate should state definitely that it only applied to the sample examined. He had recently

examined an article which, as usually sold, contained 44 per cent. of water, although, in the printed certificates attached, it was stated to contain only 26 per cent. Sometimes, also, certificates were not sufficiently explicit; for instance, some time ago, roasted acorns were being introduced under the name of a kind of coffee, yet the certificate of the analysis published therewith gave the public no idea that the article contained no real coffee, nor that it was only a cheap imitation of coffee. He thought that chemists should not lend themselves to assist in foisting upon the public at high prices, and under high-sounding names, articles which under their own common names could be bought at one-tenth of the cost. He had no doubt that the discussion would prove beneficial, by causing chemists to be more careful in the wording of their certificates, as they would now know that the critical eyes of their brethren would be more directed to them than hitherto.

PROFESSOR BISCHOF having called attention to the fact that some analytical chemists so far forgot what was due to their profession, that they actually solicited that work might be sent to them,

Mr. W. THORP spoke on the legitimacy of chemists granting certificates on what was not actually their own work; as was well known, most of the analytical work was done by assistants, who were more or less competent, but nothing appeared on the certificate to show whether the chemist who signed it had personally conducted the work or not. He did not give certificates himself, but he frequently had to do with them, and he found that sometimes the work appeared to be done by very incompetent assistants. It was recently a matter of importance to him to ascertain the amount of impurity present in two samples;—this impurity existed in very small proportion, but presented no serious analytical difficulties in its estimation. The report, which was signed by a well-known chemist, stated that the amount of impurity in one of the samples (A) was about three times as great as it was in the other (B); whereas, on making the estimation himself, he found the impurity in B to be about three times as great as in A. He thought a report ought never to be sent out unless done by the

reporter himself, or by a thoroughly competent assistant, and that it would add greatly to the value of a report if it bore on its face a statement that the work on which it was based had been performed by the reporter personally when such was the case.

THE PRESIDENT, in closing the discussion, said there had not been so much diversity of opinion as he had expected. He did not agree with Dr. Dupré that chemists should not grant certificates at all, for then the work would fall into incompetent and unworthy hands. He thought, moreover, that when it was the duty of the chemist to express an opinion in his report, he should do so without hesitation ; but, at the same time, should insist on giving his views on all sides of the question, and not merely on that which was in his client's favour. He believed it was best that the analyst should purchase his samples at times unknown to his client, and if they were found to vary, the original certificate should be withdrawn. There was no doubt a difficulty in obtaining trained and competent analysts as assistants, but this was decreasing with the spread of chemical knowledge, and would, he hoped, be still further diminished by the stimulus given to thorough chemical training by the action of the Institute.

THE
INSTITUTE OF CHEMISTRY OF GREAT BRITAIN
AND IRELAND.

REPORT OF COUNCIL.

AT this Second General Meeting the Council has to congratulate the Members on the very satisfactory progress made by the Institute since its foundation, and the sound basis, both scientific and financial, on which it already stands. At the Annual General Meeting last year, held only four months after the Incorporation of the Institute, 225 Fellows had joined, whilst at the present time there are on the Register 341 Fellows, and 53 Associates, besides 12 Fellows and 1 Associate who have been recently elected, but not yet formally admitted to the Institute, making in all 407 Members. We have lost three Fellows by death during the past year, namely: Dr. P. Haubst, Mr. W. Baker, of Sheffield, and Mr. William A. Stewart, of Apothecaries' Hall, and 1 Fellow has withdrawn. Judging by numbers alone, our progress since the last Annual Meeting has been much more rapid than might have been expected, especially when it is borne in mind that the claims of every candidate have been most carefully scrutinized, and that the Fellows and Associates admitted have been selected out of a large number of applicants. This numerous body of trained chemists who have already joined the Institute, and the many applications for admission are sufficient evidence that some form of organisation amongst the members of the profession had become a necessity.

The position which Chemistry will ultimately take amongst the other learned professions must depend essentially on the technical competency of its members, although general knowledge and

breadth of culture will tend greatly to increase its influence, as we learn from the history of the older professions. In prescribing for Candidates for the Associateship subjects of study other than Chemistry, and in accepting as part of the curriculum, the general training obtainable at the Universities, your Council has kept this phase of preparation for the Fellowship steadily in view, and, as our Universities and Public Schools bring the course of study pursued in them more into harmony with the wants of the present age, it will be possible to demand still stronger evidence of general training. It is necessary, however, above all things, that the special knowledge of the Candidate should be of the highest kind. The members of our body must be competent chemists, and, without this qualification, no one—however broad or deep his general knowledge—ought to be enrolled on the Institute. It is with this object that your Council, whilst accepting the evidence of training in General and Theoretical Chemistry afforded by certain public examinations, has determined not to delegate to any existing educational body the examination in Practical Chemistry, which is the crucial test of the acquirements of the candidate. Such an examination, conducted by an examiner appointed by the Council, will at once serve as a means of distinguishing between the mere “reader” and the “worker” in Chemistry, and as such will be cordially welcomed by every candidate who has received efficient laboratory instruction.

It is to be hoped that, as the Institute developes, its influence will secure for the young chemist a longer period of lecture and laboratory instruction than he at present enjoys, and thus ensure more thorough training, both in General and in Technical Chemistry. As a rule, twelve months’ instruction, which really means nine months’ work, is considered to be sufficient, both for lectures and for laboratory practice, although this is barely enough for the student to acquire a fair knowledge of Qualitative and elementary Quantitative Analysis, and only in rare cases a slight acquaintance with the methods employed in Organic Analysis and Gas Analysis. He knows little or nothing of the use of the spectroscope and microscope, and nothing whatever of the special or technical

application of these various means of chemical investigation. With such insufficient preliminary training, he necessarily experiences formidable difficulties in practically dealing with the problems subsequently brought under his notice, and naturally adopts the easiest processes of analysis without much reference to the accuracy of the results obtained by their use. A curriculum of this description affords no guarantee that the student who rests content with it is competent to undertake the important and responsible duties of a consulting chemist. In the course of time, he does, no doubt, complete his education himself, but his opportunities of doing this are comparatively few, and he has to spend many years in acquiring imperfectly what, as a student, he could have learned far more satisfactorily in a much shorter time. With two or three years' systematic attendance at laboratory work, and a proportionate time devoted to mathematics and physics, the young chemist would be much better prepared to commence his professional career with credit, and to profit by the experience afforded by actual practice, than he is under the present system.

It is from a consideration of the importance of inducing young chemists to spend a longer time on their professional education than is at present customary, that your Council has prescribed the general Course of Study for Candidates for the Associateship. Shortly summarised, it consists of:—

1. Geometry.—Algebra, including quadratic equations ; ratio and proportion ; plane trigonometry, and use of logarithms.

5. Physics, including heat, light, electricity, magnetism, and acoustics.

3. Chemistry.—Laws and General Principles of organic and inorganic Chemistry ; the preparation or manufacture, and properties of, elementary and compound bodies ; systematic qualitative analysis, including the use of the spectroscope and microscope for chemical purposes ; quantitative analysis of minerals, and organic compounds, and volumetric analysis of liquids and gases.

This curriculum is well within the powers of a good average

student, and will, it is believed, impose no undue hardship on anyone desirous of obtaining the rank of Associate.

The importance attaching to the training of Associates will be more readily appreciated when it is remembered that on passing to the higher grade of Fellowship, the candidate is not required by the Articles to produce any further evidence of training, but merely to show that he is 24 years of age, and that since his admission as an Associate, and for a period of three years therefrom, he has been continuously engaged in the study and practical work of applied Chemistry, in a manner that shall be satisfactory to the Council.

Your Council has determined to hold a series of Conferences on subjects more immediately connected with the Chemical Profession, and, in order to insure perfect freedom of discussion, it is considered undesirable that any formal resolutions should be passed at such meetings. The first of these Conferences, namely, that on "Trade Certificates," has already taken place, the discussion having been opened by an address from the President. There can be no doubt that the free discussion of the various points of professional ethics at these Conferences, will tend to the formation of a code which will be voluntarily observed by those who are members of the Institute, and will produce a marked effect on the Profession generally.

The two prizes of £50 each, which our President offered last year for the two best original investigations involving gas analysis, have not been claimed. They are, therefore, at the request of the donor, thrown open, not only to Associates, but to all non-Fellows of the Institute who shall, before the 31st of December next, have qualified themselves for the Associateship in all respects short of passing the prescribed practical examination, and your Council has decided to accept successful competition for these prizes in lieu of such practical examination.

In conclusion, your Council desires to express its thanks to the President and Council of the Chemical Society for the use of their rooms on this and many previous occasions.

THE TREASURER IN ACCOUNT WITH THE INSTITUTE OF CHEMISTRY
OF GREAT BRITAIN AND IRELAND.

January 1st to December 31st, 1878.

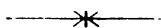
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**Audited and found correct,
Jan. 15th, 1879.**

*Somerset House Terrace,
London, W.C.*

CHARLES GRAHAM,
FREDERIC JAS. M. PAGE,
JOHN M. THOMSON.

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.



REPORT
OF
A CONFERENCE
ON THE
ADULTERATION OF FOOD.

CONTINUATION OF THE DISCUSSION,

Held Wednesday, April 2nd, 1879.

London :
PRINTED BY A. P. BLUNDELL & Co., 26, GARLICK HILL, E.C.

1879.

INSTITUTE OF CHEMISTRY.

CONFERENCE

ON THE

ADULTERATION OF FOOD.

CONTINUATION OF THE DISCUSSION,

Held Wednesday, April 2nd, 1879.

THE Discussion was resumed by

PROFESSOR ATTFIELD, who said: I am very glad to re-open this Debate for the same reason that I was glad to move its adjournment, namely, because I consider it so important that it might well occupy the attention of members of the Institute for even more than two evenings. I have very little to say on the matter myself, inasmuch as that portion of the subject in which I am more particularly interested—drugs—has been, for the present, excluded from discussion by the meeting. With regard to the adulteration of food, I quite agree with the gentleman who opened the discussion, that the adulteration of milk forms, perhaps, the best illustration that can be taken of food adulteration generally, and since listening to the debate, and after reading the report of it, I have come to the conclusion that, with regard to milk, a good deal more should be done towards settling the limits or standards: this would enable analysts to decide whether a sample has been adulterated or not. Up to the time of holding the last Conference,

I had been under the impression, from numerous and valuable published series of analyses, that the limit of 9·3 or 9 per cent. of solids not fat, was tolerably safe. I read the experiments of Dr. Voelcker some years ago, pointing in the opposite direction, and I remember, and must admit I had some sympathy with, the doubt thrown upon the validity of his results, owing to their having been obtained by processes in vogue at the time, but which were stated to have been subsequently improved. But when I heard Dr. Voelcker say in the course of the discussion that, although he had since made many analyses, he had nothing whatever to retract, I at once saw that the objections he had taken to the limit laid down were much stronger than I had previously suspected; and when I afterwards heard what Mr. Bell had to say, I came to the conclusion that the standard or limit alluded to, in the interest of the public, of chemistry and of analysts, ought to be revised. Mr. Bell stated—and Mr. Bell represents the court of appeal—that as regards milk from individual cows, each of 43 samples out of 100 yielded less than 9 per cent. of non-fatty solids, whilst no less than 18 of the 43 contained solids not fat under 8·6 per cent. Then again, with regard to dairy mixtures, he stated that no less than one-third of them gave less than 9 per cent. of non-fatty solids, whilst 12 in the 100 of these mixtures contained less than 8·6 per cent. each. Therefore, I say, taking the important statements of Mr. Bell and Dr. Voelcker, as against the important statements previously published that 9 per cent. was the limit beneath which it was safe to allege adulteration, I think the question of milk standards or limits ought to be reconsidered. When we remember, as all of us must do who read daily papers, what a very large proportion of convictions obtained under the Food and Drugs Act relate to milk, and remember the responsible position the analyst occupies, having to take care, though indirectly, of the interests of the public as well as of chemistry, it seems to me most important that this matter should be well re-considered. I am myself disposed to think that it is important enough to be taken in hand by Government, either by a Commission or otherwise, so as to ascertain whether there is any limit, by the use of which chemists can say

such and such milk is adulterated or not. With regard to the definitions of adulteration laid down by the Society of Public Analysts, I cannot, as a public analyst,—although not a public analyst under the Act, nor a member of that Society,—subscribe to them. I find an article is to be pronounced adulterated if it contains any substance which “may” render it injurious to the health of the consumer. Does it follow from this that every article sold must be absolutely free from all other things—say, even salt free from arsenic—or to what “limits” are we to be allowed to go? Then, again, an article is said to be adulterated “if it contain any substance that sensibly increases its weight, bulk, or strength, or gives it a fictitious value, unless the amount of such substance present be due to circumstances necessarily appertaining to its collection or manufacture, or be necessary for its preservation, or unless the presence thereof be acknowledged at the time of sale.” On whom is to lie the onus of shewing that this “substance” is or is not present on account of the circumstances appertaining to the collection, manufacture, or preservation of the article? Definition 3 states that if any important substance has been wholly or “in part” abstracted, unless acknowledgment of such abstraction or omission be made at the time of sale, the allegation of adulteration is to lie. Here again we come to the question of limits, and respecting very few articles of food is it clear what these limits should be. I think we ought to expect something more definite than all this before we can accept these definitions. Further on, certain substances are to be regarded as adulterated if they do not come up to the standards laid down in certain books. But what if the books themselves be wrong? It does seem to me that we, as members of the Institute, and as analysts, ought to look beyond our chemistry, and consider our position as members of the social and political community. While doing our utmost to stop the hateful, and, let us hope, not very common, practice of adulteration, while urging the interests of chemistry, and while supporting analysis and analysts, we ought to be extremely careful before we recommend limits, standards, or definitions, not absolutely trustworthy, and which, therefore, might bring discredit

on chemists and chemistry, and press very hardly upon a very important class, namely, honest tradesmen.

THE SECRETARY then read the following communication from DR. ARTHUR ANGELL:—

“ I cordially agree with Dr. Voelcker’s statement that the Sale of Food and Drugs Act has had a beneficial influence in providing the consumer more readily with pure articles of food and drink, and would add that it has to a less extent had a wholesome effect upon the quality and genuineness of drugs ; but I disagree with his next, which is, that it is easy to define, but difficult to detect, adulteration—in my opinion it is quite the opposite.

“ Dr. Voelcker admits that it is an easy matter to detect 20 per cent. of water in milk, and yet further on he insinuates that it is impossible to safely declare 5 per cent. I fail to see why. Whatever the per centage may be, the estimation must be based upon certain set figures as normal, and if these figures be set low enough to include all genuine samples, then 5 per cent. is as safely declared as 50 per cent.

“ Dr. Dupré touched the vital part of this question when he objected to the term adulteration as here applied, and insisted that in accordance with the Act, a milk is not genuine if it is not of the nature, substance, and quality demanded.

“ Genuine milks in my district never give less than 9 per cent. of solids not fat. If I marked out upon a map those parts from whence samples falling below this limit have been sent for analysis, I should find that only the most populous districts in or near towns would be indicated.

“ A great number of figures were obtained before this limit was decided upon by the Society of Public Analysts, and since that time they have been immensely added to, and the more experience one gets, the stronger the conviction becomes, that 9 per cent. is low enough.

“ Now, if a consideration of Nature’s admirable provisions for the well-being of the offspring of animals, goes to further strengthen this conviction, then, indeed, we are sure of our premises.

“ It is well known amongst students of biology, that Nature’s

supreme efforts are always made for the benefit of the young, even to an extent often detrimental, and sometimes fatal, to the parent ; this holds good from the lowest forms of beings which are sufficiently organised to present a well-defined method of reproduction, up to woman herself.

“By starving an animal whilst she is suckling her young, every secretion will suffer in quantity and quality before the milk is materially affected ; cases have occurred where women have been found starved to death, with well-nourished infants at the breast.

“The biologist, therefore, arrives at the conclusion that milk ought to be, within narrow limits, nutritively constant, and the chemist finds that it is.

“I am of opinion that the estimation of fat by loss is more accurate than by direct weighing, for it is very doubtful whether butter fat, which probably is a compound ether, will stand drying down after solution in ether, without partial decomposition. The fatty residue changes in colour and in odour, it is difficult to dry, and needs a long exposure to the heat of the water bath—this is always dangerous with butter fat.”

DR. OTTO HEHNER observed, that for the last four or five years, public analysts all over the country had been discussing this question of adulteration. Thousands of analyses had been made, and although analysts did not flatter themselves that they had solved all the problems involved, yet they thought that they had settled at least some of the points touched upon by Dr. Voelcker. Now, after years of labour, they were told that their work had been thrown away, and their conclusions were worse than useless.

When Dr. Voelcker, some years ago, published his analyses of milk, they were generally criticised, and almost unanimously condemned, not so much on account of the method by which the results had been arrived at, as by reason of his comparing the milk yielded by starving or underfed cows with that of healthy animals, and thus regulating a standard by the constitution of bad milk.

Mr. Bell had told them that 43 per cent. of all genuine milks contained less than 9 per cent. of solids not fat, but could anybody

believe that public analysts would have been fools enough to fix upon 9 per cent. as the limit, if almost every second sample gave less than that figure ?

With regard to butter, he (Mr. Hehner) might say that, in conjunction with Mr. Angell, he had originated the method now in general use. They had found that all fats, except butter, yielded 95·5 per cent. of insoluble fatty acids, and that butter fat furnished only 87·5 per cent., or thereabouts ; the composition of butter, however, was not constant, as they had found samples in which the amount of insoluble fatty acids rose as high as 88·5. Mr. Bell, however, had stated that pure butter might yield as much as 90 per cent., in spite of the fact that his (Mr. Hehner's) estimate had been corroborated by many chemists, whilst in those cases where it had not been entirely substantiated, the difference was traced to insufficient washing of the fatty acids.

He believed Mr. Bell's method of testing by specific gravity was untrustworthy, and that Dr. Dupré had found that mutton fat could have the same specific gravity as butter fat.

DR. DUPRÉ : The mutton fat was genuine, and from my own kitchen.

MR. HEHNER, in conclusion, protested against secret methods of analysis, which were only brought out by chance in Courts of Law, and which otherwise could only be obtained by intruding on the privacy of laboratories, and asking for advice.

DR. DUPRÉ did not want to raise any controversy, but would like to state a few facts which bore upon the subject. In the first year when he was analyst for Westminster, he analysed 59 samples of milk. Of these 40, or 67 per cent., were below 9 per cent. solids not fat, and 37, or 63 per cent., below 8·6 per cent. solids not fat, and 43 per cent. below 8 per cent. solids not fat, and it would be seen that nearly every milk that was below 9 per cent. also went below 8·6 per cent. In the five succeeding years, the total number of milks analysed was 168, of which 20 per cent. only were below 9 per cent.; 16 per cent. below 8·6 per cent.; and 10 per cent. below 8 per cent. solids not fat, thus shewing the effect of the prosecutions. He (Dr. Dupré) had nothing to do

directly with these prosecutions, but he might remark that in most cases in which the solids not fat were below 9 per cent., and in every case in which they were 8·6 per cent., or less, a prosecution had taken place, and the vendors had been fined, and in every case the fine had been paid—not one had appealed, which he could easily have done, and if the milk had been proved pure, would have come off with flying colours. He considered he should not be worthy of his salt as a public analyst, if, in the face of his figures, he refused to certify a milk as adulterated unless it fell below 8·6. A striking example of the check which analysis offered was seen in the result when the inspector went round on a Sunday. 12 samples were bought on two Sundays in the course of last year, and of these, 10, or 83 per cent. contained less than 9 per cent., and 8, or 66 per cent., less than 8·6 per cent. solids not fat; the corresponding figures for the rest of the year being 23 and 20 per cent. respectively.

With reference to the specific gravity of milk, he might say that he was so struck with the remarks of the Chairman, that he did not venture to question his decision, but he had since made some experiments with very curious results.

				By hydrometer.	By spec. gr. bottle.	Cream.
{	Specific gravity of milk	..	..	1033·	..	9 per cent.
	" " skim milk	..	..	1035·	..	—
{	" " milk	..	..	1032·5	1033·	9 per cent.
	" " skim milk	..	..	1034·5	1034·2	—
	" " chalk and water			1045·0	1045·4	—

Dr. Dupré also stated that he had tried various powders, and the results were identical, whether the mixture was tested by hydrometer or by specific gravity bottle. The powders were well shaken up, and the hydrometer put in instantly.

DR. ALDER WRIGHT said that it was well known to makers of sulphuric acid that the apparent specific gravity of chamber acid, as indicated by the hydrometer, is notably greater when the acid is rendered turbid by stirring up with it the finely divided sulphate of lead that accumulates at the bottom of the chambers, than it is when examined clear.

THE PRESIDENT : Can you explain this effect ?

DR. ALDER WRIGHT : The hydrometer sinks until the weight of the liquid displaced is equal to that of the hydrometer ; if the liquid is made apparently heavier by stirring up with it fine particles of a heavy solid, the hydrometer will displace, when floating, a less bulk of turbid fluid, *i. e.*, will indicate a greater specific gravity. Similarly, if the suspended solid matter have a less specific gravity than the fluid, the hydrometer will displace, when floating, a larger bulk of turbid liquid, *i. e.*, will indicate a lower specific gravity.

THE PRESIDENT : Suppose you put in a number of marbles ?

DR. ALDER WRIGHT : The marbles would produce no effect at all, because they would immediately sink to the bottom, and would not remain suspended.

THE PRESIDENT : Still, there must be a limit somewhere ; there must be some connection between deposited and suspended matter.

MR. NEISON : The readings of the hydrometer as to the amount of specific gravity depend solely upon the weight of the column of liquid above it. If a column of water, for instance, contains any suspended matter it will produce a greater or less effect upon the hydrometer, according to the weight of the suspended matter. If the water be mixed with anything heavier than itself, the readings will be higher, but if it be mixed with something lighter, such as oil, the readings will be lower. Any substance which is below the hydrometer has no effect on it ; hence, marbles would have no effect. If you put into a beaker some substance which has the same specific gravity as water, so that it will float in the liquid, it will have no effect on the hydrometer, but if you suspend in the liquid some substance which weighs heavier than the water, a portion will be suspended in the liquid above the hydrometer, and tend to increase the specific gravity.

Dr. Voelcker has suggested adopting a different standard for the amount of solids not fat in milk, for different times of the year, but I think it would be rather a difficult process to manage, for it is easy to imagine that cows in the country might be influenced in one way, and cows in town in another, by the different manner in which

their foods might be expected to vary at different times of the year, and an analyst does not necessarily know the source of the milk analysed. Dr. Voelcker suggested whether it would not be advisable, instead of fining a man for adulterating milk, for the analyst to make a public report to the vestry. I do not think that would be a very effectual way of checking adulteration. Vestry reports, as a rule, are not read by anyone but the vestrymen themselves, and the customers of the milk dealers would probably never do so. But it is another thing if the case is taken to the police court. Most people read police intelligence, although they may not read a formal report of the vestry. In reference to Dr. Dupré's statement that he once analysed a sample of milk containing a very large amount of cream, and would have condemned it if the solids not fat had fallen below his limit, after allowing for the effect of the large excess of cream, I should like to know exactly what Dr. Dupré meant by allowing for the effect of the excessive amount of cream on the solids not fat. Of course we know that cream has a smaller amount of solids not fat than milk, and an amount which varies exceedingly. Does he adopt any particular standard of solids not fat in milk? I should like to know whether he would assume so much cream was present, and deduct some arbitrary quantity from the amount of solids not fat, or whether he would adopt any other process. I have sometimes noticed that in using the hydrometer you get an unreliable result, showing a much higher specific gravity than when the specific gravity bottle is used. I have met with a sample of milk which with a hydrometer usually giving fairly accurate indications, read 1.056, when, with the specific gravity bottle, the reading was 1.036, showing a very enormous increase on the side of the hydrometer. There was no error in the reading possible. Indeed, it is at times difficult to obtain correct readings by the hydrometer with rich or thick milk, for the reason that the cream adheres to its sides, and by the action for surface tension increases the readings.

I should like to learn the opinion of the meeting as to how far colouring matters in articles of food may be permitted; it

is a question so far as milk is concerned whether a harmless colouring matter might not be allowed. Suppose a sample of very good butter turns out of a pale colour, and the people in the locality where it is found are fond of a rich-coloured butter, should the dealer be entitled to colour it with any harmless colouring matter? It is of course a matter for question as to how far this admixture of colouring matter may be allowed, but it is, at any rate, certain that an addition of this kind would not make any difference, supposing the article so coloured was also adulterated with an inferior substance—that is to say, the article would be condemned, whether the colouring matter had been used or not.

MR. BANNISTER: As this discussion proceeds, our views seem to get more hazy, and we appear to be in a greater difficulty than ever; for, on the one hand, Dr. Voelcker will have nothing to do with “standards,” which he states have been fixed by the public analysts, while Dr. Dupré, on behalf of the public analysts, says “standards” have not been fixed, but “limits” have been laid down. I think the difficulty lies in the proper definition of the word “standard,” and from the literature of the Society of Public Analysts, I gather that analysts are as troubled as we are on this point. Thus I extract from an article in the *Analyst*, for the month of June, 1877, page 51: “It is surely somewhat remarkable that the person who first brought out the *standard* of 9·3 per cent. solids not fat, and afterwards opposed in our Society the lowering of it to 9·0 per cent., should be the very man to go against the *standard*, on the poor excuse of an ash of ‘64 per cent., which does not even seem to have been examined for possible, and, indeed, probable mineral additions, although the use of boracic acid is so common in the milk trade.” Numerous other extracts might be given to show that the analysts themselves have “standards.” From what I can gather, it seems that Dr. Dupré’s “limit” is other people’s “standard.” There are also discrepancies in the results analysts arrive at, which are rather puzzling, and I will explain what I mean by referring to butter and flour. Thus, Mr. Hehner said this evening, with regard to butter analysis, that he had very carefully investigated this subject,

and had procured samples which he knew to be genuine. But why did not Mr. Hehner obtain samples from different parts of the country and at different seasons of the year, and instead of being satisfied with about thirteen samples obtained from one district, take a much larger number, and, after examining them in their fresh condition, keep them to see what natural changes would take place by keeping. If he and Mr. Angell had done so, certain remarks as to the standard of purity of butter, made in the first edition of their book on "Butter Analysis", would never have been written; for, if we compare the first and second editions of that book, we shall see that the standard of fixed fatty acids is altered, and certain butters which would have been pronounced adulterated by the standard in the first edition, would, without hesitation, have been declared genuine by the modified standard in the second.

To further illustrate how analysts' discrepancies arise, I now take the case of alum in flour. When the Adulteration Act first came into operation, it was thought by many that there was very little alumina in flour, and in looking over papers read or speeches made by different analysts, I gather that one states the maximum quantity of alumina that could be naturally present, to be equivalent to 9 grains of alum per four pound loaf, another 6 grains, a third, 3 grains, and a fourth 8 grains. In a paper of Dr. Dupré's he gives a maximum quantity of 33 grains in four pounds of flour. Now, it is admitted on all hands that when alum is used as an adulterant, the quantity generally added is from 25 to 30 grains per 4lb. of flour. Therefore, the 33 grains found by Dr. Dupré is a sufficient quantity to cover such adulteration, if the flour or bread is simply examined to determine the quantity of alumina present, and, consequently something else must be taken into account beside the estimation of the alumina. We have examined a large number of samples of flour, and find some of them contain alumina equivalent to 30 grains and upwards of alum in the four pounds of flour. In such cases the question to solve is, what quantity of alumina may have been derived from the clay of the soil? and what quantity, if any, may have been added in the

form of alum. It is, therefore, necessary to use a preliminary test on the flour or bread under examination, to find out whether any of the alumina present is in a soluble condition. The logwood test answers this purpose, and when separating the alumina, it is also necessary to estimate the silica, so as to shew the relation between the alumina and silica, and to confirm the indication of the logwood test.

DR. VOELCKER : What about the sulphuric acid ?

MR. BANNISTER : I must confess that I do not get on satisfactorily with that estimation.

It will be seen from what has been said, that there is a greater variation in the composition of such substances as butter and flour than has been generally admitted, and, therefore, on account of these variations, it is very difficult to lay down standards at all.

Mr. Hehner has this evening used strong language, and without further dwelling upon it, I may state that on the subject of milk adulteration, an analyst used language equally strong, because, when one of his samples was referred to us, we could not confirm him. In self-defence I asked him how many samples of milk he had seen milked, and afterwards examined to satisfy himself of the composition of genuine milk. He admitted, in the presence of a third person, that he had not obtained one such sample.

Now, I believe that the partial investigations which have been made have been the main cause of the discrepancies in result which exist, and, as in the case of milk, those who have tried to exhaust the subject, seem to be on one side, and the analyst on the other. We are agreed that the Adulteration Act has done great good, but when it came into operation in 1875, there was of necessity, a great demand for analysts, and some were appointed who were not competent to perform the duties of the office. In proof of this statement, I refer to the following cases which, among others, have come under my notice.

A sample of genuine arrowroot was declared to consist chiefly of potato starch, and after proceedings had been taken, the analyst admitted his mistake.

A sample of coffee was said to be adulterated with roasted

acorns, and the tradesman was fined. A second sample was declared to be similarly adulterated, and the analyst was reported to have said, "that this form of adulteration was peculiar to this county." Fortunately, a portion of this sample was sent to the late Dr. Letheby, and he found it to be perfectly pure. The excuse for the mistake was that the apparatus used had got disarranged. The case and the analyst too were, consequently, dismissed.

A sample of oatmeal was said to have been adulterated with barley and *ergot of rye*! This case was further investigated, and it was found that the supposed barley granules were nothing more than the usual aggregation of the granules of oatmeal starch, common to all samples of oatmeal, and the ergot could not be found. The services of this analyst were also dispensed with.

Other instances might be given, but these are sufficient to show that many analysts who were appointed had not sufficient knowledge. It might be said in excuse that these gentlemen were very zealous, but zeal, when not tempered with knowledge and judgment, will lead one into many difficulties. During the last year or so, the Adulteration Act has been working more smoothly, and I am of opinion that if the analysts will go on making thorough, instead of partial, investigations into the composition of the substances brought under their notice, the Act will answer its purpose, and prove a benefit, both to the honest tradesman and to the public.

DR. DUPRÉ said he must correct one statement made by Mr. Bannister. It was quite true he did publish a short note on the estimation of alumina in bread five or six years ago, but he advised that no baker should be prosecuted unless the total alumina found, calculated into alum, amounted to more than 10 grains to the two pound loaf. 10 grains in the two pound loaf gave a little more than 30 grains in four pounds of flour.

With regard to the question as to his method of calculation, he might say that if you took cream and removed the fat, the mixture remaining contained very nearly the same per centage of solids not fat as milk did. In a milk containing 3 per cent. of fat, the solids not fat were contained in the remaining 97 parts; but

in a milk with 15 per cent. of fat there were, of course, only 85 parts left to contain the solids not fat, and a correction had to be made accordingly.

He was surprised to see that Mr. Bannister confounded limit with standard. A limit was the composition of an article below which everything was considered adulterated ; but standard was something very different. A standard is the average composition of an article agreed upon by analysts. Thus, in milk, 9·3 per cent. was the standard, but 9 per cent. was the limit, and he (Dr. Dupré) felt convinced that if the chemists at Somerset House, instead of a few hundred analyses, had made several thousand, they would have arrived at this same conclusion.

MR. HELM remarked, that as the discussion had turned chiefly upon milk, he would give his experience thereupon. He held in his hand the particulars of 53 samples of milk from individual cows, every one of which yielded less than 8·6 per cent. of solids not fat. It was, he thought, absurd to talk about cows that gave less than 9·0 per cent. of solids not fat, as being either starving or unhealthy. It was not an uncommon thing to find in a herd,—all the cows of which were undoubtedly healthy and fed in the same way,—two or three that gave milk of an inferior quality, and on the other hand, some which gave milk of more than average richness. Among the 53 samples above referred to, were two from the Sewage Farm at Croydon, which gave below 8·6, but on the same day and at the same place, two other cows of a similar breed, gave respectively 10·3 and 10·4 per cent. of solids not fat. If it were true that all cows which gave less than 9·0 per cent., were either starved or unhealthy, then he must say that starving and unhealthy cows were widely distributed. He had known such samples from Camberwell, Stoke Newington, Willesden, Ewell, Croydon, Eltham, Clerkenwell, from two farms in Derbyshire, from Oxfordshire, Staffordshire, and other places; and in all these cases the samples were undoubtedly genuine, and represented entire milkings. The breeds of the cows too were as various as the places from which the samples had been obtained, and he could confirm the statement made by Dr. Voelcker, that Dutch

cows often gave milk of low quality. Many of them also were short horns, and in the face of these facts, how was it possible to assert that all samples that gave less than 9·0 per cent. of solids not fat must be adulterated with water. It might be said that the low results given were from individual cows only, and that no such results could be obtained with the mixed milk from a dairy. But it was the practice in some dairies to keep different breeds in byres by themselves, and therefore the mixed milk from a dairy might be entirely from Dutch cows, which as Dr. Voelcker observed often gave poor milk—in fact he could speak to samples of a genuine dairy mixture which gave less than 8·6 per cent. solids not fat. Mr. Bannister, he thought, hit the right nail on the head when he said that the fixing of the limits or standards had been done far too hurriedly, and before the analysts had obtained sufficient data. In confirmation of this, he might quote the case of butter, where those analysts who undertook to instruct their colleagues in the analysis thereof, fixed 85·85 as the per centage of insoluble fatty acids that might be present in genuine butter. Within twelve months afterwards, one of them, Dr. Hehner, admitted that the per centage ought to be raised to 87, so that a butter which would have been reported by him as genuine in 1876, would in 1875 have been condemned as containing a considerable per centage of foreign fat. At this meeting, he has further raised the per centage to 87·5, but this is still below what has been found by many others. In a paper recently read by a Mr. Jones, he quoted a sample which he knew to be genuine, and in which he and Dr. Dupré had found 90 per cent., and Dr. Muter 89 per cent.; but according to Dr. Hehner this sample must have been largely adulterated.

With regard to cases of undoubted adulteration, he thought something ought to be done in respect to an increase of fines. There was a case reported on Monday last in which an analyst reported a sample of milk to contain 16 per cent. of added water. The sample was referred to Somerset House, and the analysis practically confirmed, and yet the dealer was only fined one shilling and twenty-five shillings costs. The dealer who supplied

his own house had recently been convicted for selling milk containing 38 per cent. of added water, and was only fined forty shillings and costs.

MR. R. H. DAVIES observed with regard to the analysis quoted by the present speaker as having been confirmed by Somerset House, that this was not quite the fact. The analyst reported 16 per cent. of water, whereas Somerset House only reported 12. In a previous case the analyst reported 8 per cent., but Somerset House reported only 4 per cent. He (Mr. Davies) thought it would be of interest if, in the report from Somerset House, it was stated of milk to which water had been added, as to whether excessively poor milk or milk of average quality, was taken as the standard. It would be better if they thoroughly confirmed the opinion of the analyst, instead of making it appear as though there was a discrepancy, of the merits of which the public were not able to judge. He did not clearly understand Mr. Neison in his reference to a sample of milk being of the high specific gravity of 1056.

MR. NEISON : By the hydrometer. By the specific gravity bottle it was but 1035.

MR. DAVIES : Did it contain a large proportion of cream ?

MR. NEISON : About 50 or 60 per cent.

MR. DAVIES observed that although cream was not lighter than water, it was lighter than skim milk, and he thought that its tendency was to make the readings lower. It, therefore, seemed strange that a sample containing so much cream should have so high a specific gravity as 1035. With regard to alum in bread, he remembered that Dr. Dupré had stated that, if the alumina found did not correspond to more than 10 grains of alum to the two pound loaf, it should not be regarded as adulterated. Very recently he had examined a sample which contained as much as corresponded to 25 grains of potash alum to the pound of flour.

MR. NEISON said, with regard to the sample of milk mentioned by him, he was not prepared to say whether it was of very exceptional quality. What its specific gravity would have been if skimmed, he was not able to say, as it was not taken for analysis,

but for another purpose, namely, the influence of different methods of feeding. He had never noticed the occurrence of so large a difference before, although he had observed that when milk was rich in cream, it was often very thick, and tended to make the hydrometer read incorrectly.

MR. LEWIN said he could not quite understand why Dr. Dupré should have singled out the specific gravity tests in remarking on the investigation of the analysis of butter by Mr. Bell. Of fully equal importance was the ascertaining the proportion in which the various constituents of butter existed in genuine samples. And this had special reference to the estimation of the fatty acids of a fixed character. At the time the analyses were made, no accurate information was obtainable in respect to the amount of fixed fatty acids which might properly be found in genuine butter. I believe that all who have since seriously investigated the subject have practically confirmed the results obtained by Mr. Bell.

I do not see that the results obtained from the exceptional sample of fat referred to by Dr. Dupré, affect the value of the specific gravity test. I imagine the proper course for an analyst would be to obtain samples of fictitious butters as made up for sale, and in such cases, to determine whether the specific gravity was or was not a true indicator of the fat composing the sample. As far as the test has been applied in my experience and that of other analysts, I do not know of any case having been pointed out in which the specific gravity failed to show the true character of commercial samples whether genuine or otherwise. It may be added that in the analysis of a reputed butter, no test should be omitted in coming to a conclusion as to its containing foreign fat or not.

The remark made on a former evening, that in using certain equivalent weights and adding the glycerin residues, the fatty acids, should not make up more than 98 per cent., is calculated to mislead. It has been ascertained that the proportion in which the several soluble fatty acids are present in butter, varies so much in different kinds, that to use 88 as an equivalent in each case, would

give results which would differ materially on adding to the total fatty acids found, their glycerin residues. Surely a much better criterion of accuracy of work is to be found in the concordant results of two or more experiments.

MR. GROSJEAN begged to take advantage of a pause in the discussion to say a few words, not on the subject of adulteration, for it would be presumptuous in him to offer any remark on a subject with which he was not familiar. Nor did he desire to say anything about public analysts, his only connection with them being that he was sometimes at variance with them as to analyses of samples, or as to the propriety of their persuading city men that, *e. g.*, tartaric acid containing 0.004 per cent. of lead was a harmful substance. But he wished to ask the President if he adhered to the statement attributed to him on page 33 of the report of the previous meeting, viz., that it made no difference, as to the indication of the hydrometer, whether a liquid contained solid matter or not. The President had stated that Dr. Voelcker also held this opinion, but the report of the latter's speech did not bear out this view. Mr. Neison had given a clear statement as to three possible conditions, viz., (1.) when large heavy substances, like a handful of marbles were present in the liquid, (2) when small solids heavier than the liquid were present, (3) when small solids of the same specific gravity as the liquid were present. But he had omitted to say what would be the influence of small solids lighter than the liquid. The President, of course, illustrated his remarks by referring to the case of a substance with which he was himself familiar. This was not, however, always convincing to others, and the speaker had not seen much of the "moving organisms," nor did he wish to do so, while he was compelled to drink the diluted sewage in which they occurred. But the speaker would instance the case of lemon juice, which, as imported, often contained floating lemon pops, which, he believed, might seriously affect the hydrometer if a number of them got underneath it.

THE PRESIDENT, in answer to Mr. Grosjean said, that he intended to speak on this point at the conclusion of the debate. He would say now, however, that it was a question of conditions,

and in some cases solids would make a difference, and in other cases they would not do so.

Subsequently, THE PRESIDENT endorsed Mr. Grosjean's view, that rather large solids lighter than the liquid would tend to buoy up the hydrometer.

DR. DUPRÉ said that as a public analyst, he felt that public analysts had been rather harshly treated, and he would only repeat his former statement, that the Society of Public Analysts contained as good analysts as were to be found in any Society. He must again say that the sample of mutton fat he had used was entirely beyond suspicion, and why he mentioned the circumstance was, because it was the only original thing Somerset House had published. He had brought the results of the analysis of this mutton fat, which were: 1st sample, having been kept 9 months in his laboratory, specific gravity, 917.3, insoluble acids, 92.43, and soluble acids, 1.69; 2nd sample, before heating, specific gravity, 904.8, insoluble fatty acid, 95.44, soluble, 0.09; after heating some time, to about 300° C, specific gravity, 914.4, insoluble fatty acid, 93.64, soluble, 0.78.

Why did he (Dr. Dupré) object to the case of a starving cow? Because such a case was of an exceptional nature, and the limits he adhered to had been verified by thousands and tens of thousands of analyses. An exceptional case had been taken hold of, and now, when a milk dealer was prosecuted, it was always an unhealthy cow which gave this low per centage of milk. If he asked for milk he did not want it in an unhealthy condition, and if the vendor had such cows, let him sell them for some other purpose, and get those which gave milk of the proper per centage. He asked why Somerset House had taken no steps to warn anybody with regard to the specific gravity test of butter. He did not think that analysts would be likely to be taken in with pure mutton fat, but it might be otherwise if the sample were mixed with some other fat.

MR. JAMES BELL observed, when Dr. Dupré intimated his intention of reading a paper on the alleged fallacy of the specific gravity test, I immediately wrote in reply, stating that the test

could be defeated by subjecting the fat to a very high temperature for a considerable time ; and that the fixed fatty acid test was also capable of being defeated by the use of cocoa-nut fat. The mutton fat experimented upon by Dr. Dupré was not a commercial sample, and neither he nor any other public analyst has met with a commercial sample of mutton fat which has not answered to the test. The test has been adopted by the public analysts and others, and it is of great advantage from its easy application.

I was under the impression that the result of the inquiry before the Committee of the House of Commons had settled the question of the natural variations that occur in the composition of milk. To meet this difficulty and obviate cases of injury and injustice to the milk seller, Dr. Macadam, of Edinburgh, suggested to the Committee the adoption of two qualities of milk.

Although milk presents considerable difficulties, I am not aware that in any milk cases we have done an injustice to any public analyst, and we have been careful not to embarrass the analysts by spreading abroad the results of our investigations.

As to the case of 16 per cent. of water in milk, if the gentleman had referred to our certificate, he would have found that we did not state that 12 per cent. of water had been added to the milk, but that the quantity added was *not less* than 12 per cent.

MR. DAVID HOWARD thought it would be straining the meaning of the Act of Parliament, if when the mother of a family asked for milk, she was assumed to understand anything about its containing 9 per cent. of solids not fat ; her intention would be to receive it as it came from the cow. The difficulty was that milk did vary ; was a vendor to be punished because he sold milk as it came from a cow which did not give it of the standard quality ? It had been said that the fines being so small did not prevent adulteration. But it should not be forgotten, that to a good many dealers, the fact of being fined was ruin, and in proportion as the *clientele* was of the better class, thus indirect punishment was more severe.

DR. ALDER WRIGHT thought the amount of added water should be calculated upon the limit, and not upon the average, and the

reports made out stating that the milk sold contained so much per cent. of milk of the lowest quality, admitted as possibly genuine by the Society of Public Analysts, and so much additional water. Thus, suppose that a sample contained 8 per cent. of solids not fat; thus corresponds to $\frac{8}{9} \times 100, = 88.9$ per cent. of milk containing 9 per cent. of solids not fat, and 11.1 per cent. of additional water; such milk would therefore be certified as containing *at least 11 per cent. of added water*. If, however, the added water be calculated from the average compositions (taking that as 9.3 per cent of solids not fat), the amount of genuine milk present would be reckoned as $\frac{8}{9.3} \times 100, = 86.0$ per cent. of milk, containing 9.3 per cent. solids not fat; and consequently the added water would be 14.0 per cent.; in this case it could not be certified that the milk contained *at least so much* added water, but only that it was comprised in 100 parts, of 86 parts average milk and 14 parts extra water, which would open the way to disputes and conflicting evidence as to the natural fluctuations in composition of milk, and as to its average composition to a much greater extent than the former form of report; which, moreover, he believed from his own experience was more easily understood by the public generally.

Referring to his previous remarks as to the use of the hydrometer, Dr. Alder Wright illustrated the effect of suspended substances thus: Supposing that equal bulks of water, specific gravity = 1, and an oil of specific gravity 0.8 were agitated to a uniform emulsion and tested immediately either by the hydrometer or any other method of determining specific gravity; the specific gravity of the emulsion would clearly be 0.9. Similarly if the oil were heavier than water, say of specific gravity 1.2, the emulsion would have the specific gravity 1.1; in each case the mean of the specific gravity of the constituents. In the same way the specific gravity of the mixture would be lower (or greater) than that of water if the admixed substance were added in any ratio by bulk different from that of equality, the diminution (or increase) in specific gravity being less, the less the proportion of added substance. Whether the admixed substance were fluid, like oil,

or solid, like particles of chalk, sulphate of lead, &c., the principle would be the same; the indication of the hydrometer being in all cases the lower, the more admixed light substance, or the higher, the more admixed heavy substance, was in suspension. As soon as the suspended matter separated, it would, if heavier than water, subside and, consequently, cease to affect the hydrometer; this would not be the case so completely if the suspended matter were a fluid lighter than water (like oil), because part of the total fluid displaced by the hydrometer would be still oil; the amount of the buoying up of the hydrometer thus produced would depend, *inter alia*, on the shape of the instrument.

DR. VOELCKER: With regard to milk, he thought it was difficult to fix a standard or limit, owing to the variations constantly occurring. Food had a considerable influence on the quality of the milk: the time of year, and the breed—whether large Yorkshire, or small Alderney cows—also greatly affected it. As to the improved methods of analysis, he should like to know in what they consisted. Would any one pretend to say that chemists, previous to 1865, or years before that time, did not know how to make accurate milk analyses? He had heard it said, however, that some analysts worked so cheaply that they could not afford the time to perform these analyses very carefully. As far as his own experience went, in the course of every year he made a great number of milk analyses, and had no cause to modify in any way his former statements. He got samples from all parts of the country, whilst Dr. Dupré, and other public analysts, he apprehended, got milk only from certain districts and from certain cowkeepers. Although he had been harshly dealt with by his friends, the public analysts, they had not better friends than himself and Somerset House. The public analysts had made a good many rash statements, but had now become more cautious; still, they were not always over cautious. A good deal had been said about the adulteration of butter. He had seen it complained of by a public analyst who had a sample of butter containing $17\frac{1}{2}$ per cent. of water, that no prosecution had followed, because, Mr. Bell, of Somerset House, had stated that a

butter might contain 18 per cent. of water, and yet be perfectly genuine. But he had examined a sample of butter made in a gentleman's house, which contained as much as 18 per cent. of water, and if a butterman were prosecuted for selling such butter, which, if made in a private establishment, would be passed unnoticed, it would do more harm than good. Again, it sometimes happened that a case was found for prosecution because the sample was excessively salt. But the question of salt, was, after all, a matter of taste.

In the winter time, when cows were fed upon roots, the butter was very pale, and it might happen that those who were accustomed to butter of a yellow straw colour, would look with suspicion upon it. Hence, Normandy butter always was liked because it was fully coloured. This was a case where harmless colouring was perfectly allowable. The same with cheese. Cheshire cheese was generally highly coloured, but Cheddar was pale. This was certainly a matter of taste, which they ought not to fight against. If, on the other hand, a substance had had copper added to it, this could not be permitted, for, although a small amount of copper might be harmless, the practice was open to abuse. With respect to alum in bread, he agreed with what had already been said, that the tests must be used with some discretion, as a good, ready method of determining the exact amount of alum was still wanted. He had been trying the proportions of alumina and silica, and finding the ratios, but there was some difficulty, because the relative proportions of clay and sand differed very much in the different soils which might adhere to the wheat. He had also tried the sulphuric acid method, but here again there was a liability to error, as by burning to a white ash, sulphuric acid was driven off, whilst, if it were simply charred, there was a reduction of the sulphates to sulphides, moreover, the salt used in bread making also contained variable quantities of sulphates.

THE PRESIDENT: I am sure you will agree with me that the discussion of this very important subject has thrown a great deal of light upon it, to the advantage of many of us, myself among

the number. It would seem that the troublous times of the public analysts were coming to a conclusion, and that the effervescence going on for several years past was gradually subsiding under the effect of a fair statement of views from all parties. Chemists are now rapidly converging to fairly unanimous opinion as to the processes of detection, and as to the limits or standards to be adopted in the cases of such articles as milk. It is to be hoped that these will also be decided upon in such a way as neither to inflict injury upon the salesman, nor yet to subject the public to actual fraud. It seems to me that it would be desirable, if possible, to distinguish between inferiority of quality, and adulteration. If any salesman intentionally puts water to his milk, he ought to be fined heavily; but if a man sells unwatered milk from a poor cow, he is in a very different position, and ought to be treated differently by the law. If a standard of average quality could be decided upon by chemists, as well as a minimum limit, the variations between the average and the limit might be regarded, not as adulterations, but as lowness of quality, and the vendor fined, not for adulterating, but for selling an article below a certain standard quality. Thus the matter might be simplified, and the hardships which sometimes fall upon the ignorant, though innocent tradesman, avoided. I quite sympathise with Dr. Voelcker in his observations as to leniency in regard to harmless adulterations. The public in this matter require a good deal of education, and should be taught that articles may vary in colour without suffering in quality—for instance, that it is quite as good for them to eat butter which looks like lard, as it is to eat that which is more or less coloured.

With regard to the hydrometer. If you take two liquids mixed together, such as the fat of milk and an aqueous solution, and take the specific gravity of such a mixture with the hydrometer, you really take the specific gravity of the continuous liquid (which, in this case, is the aqueous solution) not of the separate material which is suspended. Everyone must admit this in the abstract, although in practice it does not appear to be absolutely so. Supposing you have a vessel containing a saline solution, and you put the

hydrometer into it ; and you then lower into the vessel a number of marbles, suspended by strings from little floating cups at the top. Everyone will agree that this will not affect the specific gravity of the liquid in the slightest degree. But, unless the suspended matter has exactly the same specific gravity as the liquid, it must be moving upwards or downwards, displacing the liquid in the opposite direction, and, therefore, must, to some extent, affect the hydrometer.

That it will do so exactly in the proportion of the mixture, I should scarcely have expected. Dr. Dupré's experiment is a very important and interesting one, and it would be very desirable to repeat it, to see whether it holds good or not in other cases, and whether the hydrometer when used in a mixed liquid like milk can be depended upon as well as the specific gravity bottle.

There is no doubt a good deal in what Dr. Voelcker so emphatically advanced, with regard to the low fees paid to public analysts. It is absurd to think that an analytical determination of a delicate nature can be made with the necessary care and attention, for such fees as 2s. 6d. or 5s. Nevertheless, I would strongly advise analysts not to perform their work carelessly. Let them make their analyses by the best methods, or decline the work altogether. In conclusion, the President asked the meeting to pass a cordial vote of thanks to Dr. Voelcker for the important service he had done them by introducing the subject.

DR. VOELCKER, in acknowledging the compliment, said he had one remark to make, and that was, the standard of the amount of fat in milk appeared to be too low. The per centage of fatty matter ought to be 3, rather than $2\frac{1}{2}$. This was a very low limit, especially as most milks were skimmed to a certain extent. In certain months of the year a very considerable amount of cream could be taken away, and this was done, and he (Dr. Voelcker) would suggest to the Society of Public Analysts the consideration that it was not so much the quantity of solids not fat which was wanted, as cream.

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

R E P O R T
OF
A C O N F E R E N C E
ON
THE RELATIONS OF THE CHEMICAL
PROFESSION TO PUBLIC SANITATION,

Held Wednesday, November 12th, 1879.

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1879.

INSTITUTE OF CHEMISTRY.

CONFERENCE

ON THE

RELATIONS OF THE CHEMICAL PROFESSION
TO PUBLIC SANITATION.

Held Wednesday, November 12th, 1879.

DR. C. R. ALDER WRIGHT said—

It is a self-evident proposition that civilization necessarily introduces various sources of injury to health which do not exist amongst uncivilized nations; amongst such injurious influences may be cited the massing together of large populations on limited areas, which tends to produce various diseases through the action of many different causes, of which an important one is the pollution of air and water through imperfect means of removing the excreta from the body by ventilation, drainage, &c.; whilst the spread of arts and manufactures daily introduces and extends the use of materials and products in the preparation of which unwholesome emanations are apt to be evolved, thereby causing injury, not only to the workmen engaged in the processes, but also to other members of the community. That the spread of civilization sets in motion agencies which tend to prolong life, as well as those which tend to impair it, is also true; the extension of medical skill and the knowledge gained of the conditions requisite for perfect health under different circumstances

at least a year previously ; and this degree can only be obtained after passing, in succession, the Matriculation (sometimes familiarly styled "diluted omniscience"), Preliminary Scientific, 1st M.B., and 2nd M.B. examinations, between the first and last of which four years must be spent in study at one or more of the medical schools or institutions recognized by the University. Besides the subjects already taken up in these four previous examinations, the candidate must show satisfactory acquaintance with "Chemistry and Microscopy, as regards the examination of Air, Water, and Food"; certain branches of "Meteorology," "Geology," "Physics, and Sanitary Apparatus," also form part of the examination, which further embraces, "Vital Statistics," "Sanitary law," and, in particular, "Hygiene," of which branch some nineteen different subsections are enumerated in the calendar. The circumstance that the possession of the degree of Bachelor of Medicine (which of itself implies a medical education of a somewhat higher class than that attained to by average non-graduated practitioners) is not sufficient to stamp a man as a competent medical sanitary officer, clearly shows that it is unlikely that any large proportion of the gentlemen obtaining appointments as medical sanitary officers will, for some time to come, be men who have passed the London University Public Health Examination, or any other similarly stringent one, still less, one requiring the expenditure of a further amount of time in acquiring a thorough knowledge of quantitative analysis ; for it is evident that this examination, searching as it is both in its own nature and in the character of the previous training requisite, affords no guarantee that the graduate who has passed it is a sound and competent chemist, inasmuch as it is not evident from the regulations that any kind of *quantitative* analytical knowledge is essential for any of the five examinations required in all.

If, then, the premises be conceded : firstly, that for the performance of many duties pertaining to the office of a thoroughly competent sanitary officer an accurate knowledge of analytical chemistry is indispensable ; secondly, that the existing regulations as to the training of such officers, even of the very highest

class, do not provide for the acquirement of this thorough knowledge (although they do provide for the acquisition of a smattering of some minor portions thereof); and, thirdly, that to compel sanitary officers of the highest class to spend, in addition to the four or more years now required to be passed in almost continuous professional study and preparation for examination, an additional couple of years or more in acquiring a competent knowledge of analytical chemistry (*e. g.*, such a knowledge as would enable them to become Fellows or Associates of the Institute of Chemistry), would be practically to limit most undesirably the number of men who would consent to pass through such an arduous curriculum; it must result that it is essential that sanitary officers should be divided into two classes, *viz.*, those possessing the special medical knowledge and training requisite for the due carrying out of the medical portion of the sanitation system rendered necessary by the march of civilization and progress; and those possessing the special chemical skill and attainments requisite for the proper discharge of the chemical portion of this system. In other words, it appears to be desirable that the system of sanitation now being developed throughout this country should be extended in this sense, that, instead of having only one kind of sanitary officer (*viz.*, the "Medical Officer of Health"), there should be two classes, *viz.*, *Medical Sanitary Officers*, and *Chemical Sanitary Officers*, the latter body being engaged in the performance of such duties as require special knowledge of chemical analysis, &c., the which duties are at present either neglected altogether, done in a perfunctory manner, or relegated to some other kind of official, not always enjoying the same status, or possessed of the same authority, as the Medical Officer of Health.

Before such a twofold system of Sanitation could be effectively worked, it is possible that a Special Government Department, perchance under the control of a "Minister of Public Health," might require to be constituted. It may be that the Medical Department of the Privy Council could be augmented into the "Sanitary Department of the Privy Council," with two sub-departments,

and that for effecting the removal of these injurious influences when existing, and preventing their occurrence as far as practicable, by putting in force such legal restraints and powers as already exist, and taking steps to obtain such extensions of these powers as may from time to time be rendered desirable or necessary.

Medical science generally, and the exercise of ordinary powers of observation aided by special knowledge and experience, afford the means of carrying out the first and fundamental branch of sanitation, viz., the laying down of canons as to what conditions and circumstances either have in former times produced injury to health, or are likely to do so in future: with this branch of sanitation, professional chemistry, has only the very indirect association that probably most of these injurious effects are due to improper chemical changes induced in the bodies of the sufferers; but as our knowledge of the actual internal mechanism of these abnormal chemical changes (and, indeed, of most of the normal changes in the organism, as well as of the exact *modus operandi* of most drugs), is at present only of the most general and superficial character, the whole of this branch, although theoretically wholly within the domain of the scientific chemist, is practically quite outside of that of the professional chemist. To a great extent, also, this is true of the third branch, viz., the compulsory removal of causes of injury to health, and prohibition by the exercise of legal authority, of such causes being set in action when not previously existent. When the chemist, as such, is mixed up in this branch of sanitary duty, it is simply as an expert, adviser, or witness, just as is the case with the medical man, as such, under similar circumstances.

It is otherwise, however, with the second branch of sanitary science above referred to, viz., the determination whether, in any given case, conditions obtain which are known or believed from past experience to be injurious to health: in a very great number of cases, the requisite information can only be gained by the performance of chemical operations, often requiring a high degree of skill and profound acquaintance with laboratory

manipulation. For instance, the inspection of chemical works under the Alkali Act, for the purpose of determining whether the air pollution caused by these works is kept down within certain limits; such work as that done by the Rivers Pollution Commission, and the various public analysts throughout the country under the Sale of Food and Drugs Act; and so on. In matters such as these, the chemical knowledge of the ordinary medical officer of health is usually quite insufficient for the purpose required. The course of practical chemical training passed through by the average medical student, embracing little more than a smattering of qualitative analysis, and frequently not that, is not sufficiently deep or extended to render it possible for him to obtain reliable analytical evidence by the work of his own hands; and, even when a course of so-called special instruction in the analysis of water and articles of food, is superadded to the limited amount of laboratory experience gained during his curriculum, the result is often the production of but an indifferent analyst, as various cases under the Food Adulteration Acts have shown.

In the writer's opinion, the importance of a thorough knowledge of analytical and general chemistry on the part of sanitary officers is such as to render it desirable that a considerable change should be brought about in the way in which public sanitation is now carried out. The magnitude of the acquirements now expected of a first-class medical sanitary officer, and rendered necessary by the multifarious duties that often fall to his share, is, however, too great already to render it reasonable to demand that a man should spend some two or three years in the study of analytical chemistry, as well as the large amount of time requisite for the attainment of the other branches of knowledge required to be possessed by him. As an illustration of the onerous and laborious course of study and preparation now considered necessary for a first-class medical sanitary officer, the regulations of the University of London with reference to the "Examination in subjects relating to Public Health" may be quoted. Before being admissible to this examination, a candidate must have taken his degree as Bachelor of Medicine in the University of London

are amongst the chief of these agencies ; against which may be set the consequent deteriorating influence on the average health and strength of the community, through the circumstance that individuals of weakly constitution, instead of being killed off early in life by inability to bear hardships, as is the case in most uncivilized races through a true "survival of the fittest," are now-a-days largely enabled to grow up and propagate races of comparatively feeble vigour and vitality.

With this latter cause of injury to the health of the population, as well as with the evils introduced through voluntary and habitual overwork, mental anxiety, imperfect observation of the conditions as to diet, exercise, &c., best suited to the individual, and many similar injurious influences, the present paper has nothing to do ; they hardly belong, if at all, to that class of causes of injury to health which can be in any way grappled with by the Legislature, save in an indirect way by the enforcement of elementary instruction in the general principles of hygiene in all our schools : for, desirable as it may be that persons of unsound health or hereditarily disposed to consumption, scrofula, insanity, &c., should not become the parents of children cursed with the same weakly frames as themselves, it is not likely that, in this country, at least, a law would ever be passed preventing persons of such infirm and unsound constitutions from being able to contract a legal marriage ; and even if such a law were passed, as has been suggested before now, it is not clear that it would effect the desired result of diminishing the number of congenitally unhealthy children. This result can only be brought about by the operation of causes dependent solely on the individuals affected.

Many of the other noxious influences on health introduced directly or indirectly through the spread of civilization and progress admit, however, of being diminished and kept within comparatively narrow limits by the use of proper precautions, the observance of which can be legally enforced without great public inconvenience ; it is the recognition of this fact, and of the validity of the principle of "the greatest good to the greatest

number," that has led to various legislative enactments being passed for the purpose of finding out, by the appointment of suitable officers, where these noxious influences are in operation, and of enforcing, when necessary, such restrictions on, alterations in, or modifications of the causes of these influences, as will diminish or abolish their evil effects; even though this enforced procedure may result in serious pecuniary loss, or other inconvenience, to individuals. Thus arises the appointment of factory inspectors, to see that children and others are not habitually overworked; of mining inspectors, to see that certain causes of danger in the mines are minimized; of inspectors deputed to examine chemical works, &c., to see that undue pollution of air by noxious emanations does not take place; of food analysts and inspectors, to guard against injury to health by adulteration of the food supply; of medical officers of health, to see, amongst other things, that proper conditions are observed in dwelling houses, &c., for avoiding injury to health from defective ventilation and improper drainage, for preventing the spread of epidemics, fevers, small pox, and other contagious diseases, &c., &c.; and of various other analogous officials, armed with authority not only to investigate into such matters, but also to enforce compliance with such alterations and changes as the requirements of each several case may render necessary; and from this, too, arises the existence of such laws as permit of the enforced removal or prohibition (after due legal trial and inquiry) of a manufacture, &c., carried out under such conditions as to be a nuisance and source of injury to the surrounding population; of the destruction of food in a state unfit for consumption, and of cattle suffering from rinderpest, &c.; and, generally, of the compulsory removal, and, as far as practicable, prevention of the existence, of sources of injury to the public health.

Public sanitation, then, in the widest sense includes three kinds of machinery, viz: that for finding out what conditions and circumstances, produce, or are liable to produce, injurious effects on the public health; that for determining whether, in any given instance, such conditions obtain or circumstances exist;

viz., the Medical and Chemical ones (possibly, a third, the Mining Sub-Department, having to do with the inspection of mines, &c., and even more sub-departments might be requisite). In whatever way this Sanitary Board or Department were ultimately constituted, it should bring under one common control a number of things at present isolated in their action, and therefore, in some respects, not so effective as is desirable. This department should be responsible for the proper putting into force of all acts relating to Public Sanitation, such as the Alkali Act, the Sale of Food and Drugs Act, the Rivers Pollution Prevention Act, the Public Health Act, and the various Acts relating to the Medical Profession generally, Pharmacy, Lunacy, Local Boards of Health, &c., &c.; and for the appointment of the necessary officials and officers requisite for the due discharge of the duties of the Department. Without interfering materially with the powers of Local Boards to elect their own local medical and chemical sanitary officers, the Department should exercise such supervision as to ensure that competent men were appointed, and that the purposes of their appointment were not nullified by purposed neglect and obstruction, such as occasionally takes place under the existing system, as, for instance, when a public analyst is appointed for a district, so as to comply with the letter of the Act, but its spirit wholly stultified by the intentional neglect of the obtaining any samples of food, &c., for him to analyse!

The following is an outline of the writer's notion as to how the duties of a chemical sanitary officer should be carried out, and of the provisions that should be made for their due performance.

In the first place, the chemical sanitary officer for any considerable district, should necessarily be something more than simply a person who had a knowledge of general analytical operations: just as instruction in numerous subsidiary branches of knowledge, besides the art of diagnosing disease and prescribing for its cure, is requisite in the "Medical Officer of Health" as he exists at present, so a knowledge of various branches of science more or less akin to chemistry, and requisite in the case of questions as to drainage, water supply, nuisance, air pollution, and

the like, would be essential in the skilled chemical sanitary officer. Possibly, it might be desirable that a special form of diploma in the chemical sub-department of Public Health should be instituted, the possession of which would be a guarantee of having passed satisfactorily through the particular curriculum prescribed for officers of this kind. In this respect the examinations now compulsory for the Associateship of the Institute of Chemistry would occupy a position about equivalent to that which the examinations of the College of Surgeons, and other medical licensing boards, occupy in reference to the acquirements of a Medical Officer of Health.

Secondly, inasmuch as it would probably be convenient that the chemical sanitary officer for any given district should be, *ex officio*, the public analyst under the Sale of Food and Drugs Act for that district, a suitable district laboratory and staff of competent assistants would be required ; for, under the energetic system of Sanitation supposed by the writer to be in force, the Sale of Food and Drugs Act would be carried out in a manner very different from the present diminutive scale of procedure. Instead of an analyst being appointed at the munificent salary of £80 or £100 per annum, to do perhaps a couple of hundred analyses in the course of a year, the district laboratory staff should include, besides the head chemical sanitary officer (of status equal to that of the medical sanitary officer, and paid at the rate of £600, £800, £1000, or even more, per annum, according to the district), such a staff of principal and subordinate assistants as the size of the district and its population might render necessary. Instead of an analyst examining, as at present, in the course of a year perhaps one sample for every hundred food shops of one kind or another in his district, a small army of food inspectors should from time to time pounce down simultaneously on, say, every baker or every milkman, &c., in the whole district, thus collecting samples perhaps by hundreds at a time. A system of supervision such as this, coupled with effective support from the magistracy in cases of convictions (such, perhaps, as imprisonment without option of fine for a third offence), would soon lead to a wonderful

in a specialist exalting too much his specialism. I mean by this, that in a nuisance case, the chemist might be inclined to regard the chemical aspect as of too great importance, and the physician to think too much of the medical aspect, both disregarding the opposite side of the question. This compound animal (half doctor, half chemist), on the other hand, although he might not take so accurate a view of either the medical or the chemical side *per se*, is more likely to take a better view of the whole. "Now," says Dr. Wright, "how are you to get this compound animal?" and he very properly asks, "Are our medical schools doing anything to educate him?" I am not going to defend the practical chemical teaching of the medical schools. Dr. Wright says, "The course of practical chemical training passed through by the average medical student, embracing little more than a smattering of qualitative analysis, and frequently not that, is not sufficiently deep or extended to render it possible for him to obtain reliable analytical evidence by the work of his own hands." I do not dispute that statement, but I say that, looking back to the time when I first entered as a medical student, a marvellous improvement has taken place in the matter of practical teaching, and an equally marvellous advance in the interest taken in it by students. I scarcely like to refer to my personal knowledge of this improvement, but I may, perhaps, say, that out of 60 men in my own practical chemistry class, last summer, 51 never missed a demonstration. Although I do not mean to attach importance to the amount of analytical work the students may learn, nevertheless, it undoubtedly furnishes a certain foundation for them, upon which to build and to work in the future for themselves. Now, sir, among the many great advantages to be derived—if I understand Dr. Wright—in the appointment of a public chemical officer, is that he will be able more fully to carry out the Adulteration Act. Dr. Wright has rather bold views on the subject. He is not content with 200 samples of food, as at present, being examined in one district in the course of a year, but suggests the appointment of a small army of food inspectors, who from time to time shall "pounce" down simultaneously upon

the bakers in a whole district, collecting samples by hundreds at a time. Now, sir, although Dr. Wright has, I admit, enormous persuasive powers, I do not think he will ever manage to persuade local authorities into *that*. I am bound to say this, that local authorities do not seem to attach that importance to the Adulteration Act which some fondly hope. The general feeling of local authorities is not, in my opinion, in favour of their extension, but rather the other way. Local authorities say, and very correctly, "How many cases of prosecution under the Adulteration Act are instances of adulterations actually injurious to health?" They will say (and a great many of these members of local boards are very clear-headed, faithful representatives), "If we found tradesmen putting coculus indicus into beer, or metallic substances into sweets, we would prosecute and punish them without mercy; but what are the usual cases of adulteration prescribed? Water in milk, fats in butter, starch in mustard, chicory in coffee, sugar in cocoa, and things of the like kind." Now, sir, it appears to me, there is something analysts have lost sight of too much in all this, although local authorities have not lost sight of it. There is in trade a thing called *competition*, and I cannot help thinking this army of inspectors pouncing down on every baker in a district, collecting samples by hundreds at a time, would destroy a great principle of all trade. The fact is, that trade is difficult enough as it is, and that such a system as the one Dr. Wright suggests, would make it ten times more so. I cannot help thinking there is a danger in any extension of the Adulteration Act. It has already done something we did not want, viz., it has made adulteration a little more scientific. What have the constant prosecutions in the matter of milk done? The milkman has increased the price of milk, and not materially improved the quality. There is no disputing the truth of this, for the milkman, nowadays, does his best only to reduce his milk to meet what is called a "standard," required by a certain body of analysts. From this point of view, the Adulteration Act, as at present worked, may even have done harm to the public. There is, however, one point which Dr. Wright has mentioned, which

formation of a guild of professional chemists ; thirdly, the hearty co-operation of many leading chemists—now largely represented on our Council—in altering, modifying, and reducing to practicable shape the rough notions thus sketched out. Amongst the friends to whose labours the practical successful establishment of the Institute of Chemistry is mainly due, the writer is glad to have the present opportunity of naming Mr. W. N. Hartley, by whom a very large portion of the more laborious part of the preliminary rough shaping work was carried into effect. Should the hopes of the writer be fulfilled, and the present paper be the means of directing attention to the important part played by professional chemistry in a thorough scheme of public sanitation, not only will considerable advantage be derived by professional chemists as a body, but, which is of far more importance, a considerable addition to the public good will accrue.

THE PRESIDENT : We are much indebted to Dr. Wright for his suggestive introduction to this Conference. He has given us a wide range of subjects for discussion—from the regulation of marriages to the establishment of “an army of inspectors to pounce down on the tradesman.” Many of these suggestions are of great importance, although, as Dr. Wright himself owns, some of them are, at the present time, very unlikely to be carried into effect. Still, we are a progressive nation, and it is to be hoped that we shall make progress in the direction indicated. State interference of this kind at its outset met with powerful opposition, but thinking men seem to be gradually coming to the conclusion that Government organisations constitute the most efficient means for carrying out sanitary regulations. I will not, however, take up your time with any remarks of my own, as there are many gentlemen here much better acquainted with sanitation than I am, and we may anticipate an interesting and valuable discussion of the subject which Dr. Wright has so ably brought to our notice.

DR. MEYMOTT TIDY : I should be unwilling to trespass on the time of the members, were it not that, as medical officer of health of one of the largest Metropolitan parishes, containing over

295,000 persons, and also as a chemist, it may fairly be supposed that this question of the relationship of the chemical profession to sanitation, does not come before me to-night for the first time in the paper which has just been read. It appears to me that a man may be a very excellent *medical officer of health*, and yet know nothing about chemistry; and the reason of this is obvious, viz., that it depends upon the laws and acts under which he is appointed, and which it is his business to administer. I speak of the Nuisance Removal Act and the Metropolis Local Management Act, for instance. Now, what is the duty of a medical officer of health under these Acts? We must face this fully. A medical officer smells a stink. He says to himself, "This stink is injurious to health." He says, "My opinion is, that this stink comes from so-and-so." He goes back to his office, and serves a statutory notice on the owner or occupier of the premises (according to his judgment), to abate the nuisance within 21 hours, or 21 days, as he thinks fit. It is not his business to ask himself the cause of the nuisance, nor to suggest a remedy. I appeal to you, then, whether a man may not do this work perfectly satisfactorily, and yet be ignorant of "bonds" or "radicals." But I now go a step further: I say a man cannot be a *good sanitarian* without being fully acquainted with chemistry. A good sanitarian smelling a stink, argues, for instance, to himself, "This is in the neighbourhood of an oil of vitriol factory." He says, "I know what the cause of the smell probably is." But he goes further than that. He is not content with imagining the cause, or even with the evidence of his nose, but he says, "I must proceed to prove that the smell is due to the cause I suppose." And his chemical knowledge leads him even a step further, for, he not only knows the cause of the stink, but he is able to suggest the remedy. A good sanitarian always believes that to cure a nuisance is infinitely more scientific than to annihilate a factory. You will, perhaps, pardon me if I think it admirable that this *medical* sanitary officer and this *chemical* sanitary officer should be combined in a single individual. I must run the risk of your thinking it personal to hold such an opinion, but there is always a danger, to my mind,

alteration in the nature of food stuffs sold, or, at least, in the names and titles under which they were sold.

Besides supervising this class of work, the chemical sanitary officer would also be required to undertake the investigation of questions falling within his scope, relating to the character of water supplies, sewage contaminations, nuisances, &c., &c. In all probability it would be found desirable that the inspection of works under the Alkali Act, and other Acts of a similar nature, should be carried out as at present by a different staff of inspectors; but consultation with the chemical sanitary officer of the district, and co-operation on his part, might often be advantageous. Moreover, another class of work might with great propriety be *ex officio* relegated to the chemical sanitary officer, viz., the examination for poisons, &c., of stomach-contents and the like for coroner's inquests, *i. e.*, as long as the anachronism of the "crown's quest," as it is still conducted, continues. Under existing circumstances, a coroner is only empowered (without a special order from the Home Secretary, only granted in exceptional cases), to pay at most a guinea for an analysis and another for attendance to give evidence—a scale of fees clearly insufficient to obtain the services of competent analysts. Accordingly, it often happens that analyses are not made at all on account of the expense in cases where it is desirable that they should be performed, whilst in many instances the analytical operations are intrusted to imperfectly skilled hands, who bestow on the work an amount of knowledge, labour, and time just commensurate with the fee paid, and no more: usually finding no trace of poison, for the simple reason that the mode of testing employed would not detect it, were it there. Such a so-called analyst will test potable water for lead by adding potassium chromate, and if no precipitate is thrown down, will regard lead as absent. Occasionally, however, to balance matters, a poison is found which is not there, as in one instance where arsenic was pronounced to be present in certain stomach-contents, because the matter, when treated with nitric acid and strained, gave a precipitate (of sulphur) with sulphuretted hydrogen, no

confirmatory test of any kind being employed. It is manifest that if an examination for poisons be made at all, it should be done thoroughly and properly; wherefore, the appointment in each district of a chemical sanitary officer, whose duties were understood to include the performance of analyses for inquests (or, at least, the supervision of the examination by skilled under-chemists) would be far preferable to the present unsatisfactory state of matters in such cases.

It may be urged that the establishment of a chemical sanitary officer at a high salary, with a number of properly paid assistant chemists in each district, would add notably to the rates, and that a popular objection would thus be created. But, in the first place, the actual increase in expenditure in any given district thus introduced would be relatively but small; and, secondly, the advantages accruing to each food consumer by the greatly diminished probability of his being supplied with adulterated and sophisticated provisions, and the lessened risk of unwholesome emanations in the air he breathes, &c., &c., are well worth paying a trifle extra for.

The views thus put forward for discussion will, doubtless, appear to be very crude, and in some respects impracticable; but it may be that, although these suggestions in their present form could not readily be put into practice, yet discussion thereon may point the way to some better system, or to such modifications of existing arrangements as are possible, and which would more or less completely fulfil the objects in view. That this result might possibly ensue the writer is encouraged to hope from the circumstance that the existence of the Institute of Chemistry itself is traceable to a similar origin, viz., firstly, the suggestion in 1872 by Dr. Frankland to the Council of the Chemical Society of the creation of a class of Fellows to be styled Licentiates of the Chemical Society, or by some analogous title, for the purpose of distinguishing between competent professional chemists and those interested in chemistry only as a science: a proposition not adopted by the Council; secondly, the subsequent suggestion in January, 1876, in the *Chemical News*, by the writer, of the

certainly has a very intense undercurrent of truth in it. He suggests whether one reason why there has been so little success in working the Adulteration Act, may not be due to the inferior analysts who have so often been appointed. This is a very delicate question. I may venture, as my own opinion, to say that, when the chemical history of this country for the last few years comes to be written, there will be found in the general brightness of the chemical work to be recorded a few dark spots. At the same time, I cannot help thinking that in the midst of these dark spots will shine out this fact, that it was because of the inefficiency of some who pretended to be chemists, but were not, that it was found necessary to establish the Institute of Chemistry. I cannot help thinking that the establishment of this Institute has done much to sweep away that false notion that a man may become an analyst by attending six lessons in a laboratory, or become a chemist by reading a ninepenny primer of chemistry. Only one thought more. If we are to raise the chemical profession in the respect of local authorities and of the public generally, we must teach the people that chemistry is not a thing that can be acquired at a moment's notice. We must inspire local authorities with confidence in Science, where now there is doubt, and certainty where there is now unrest. And that we shall do, not, I venture to think, by such means as Dr. Wright has suggested, but by teaching them, first of all, that chemistry is a magnificent science, which requires no advertisement to draw attention to its work, and no testimonial to announce its claims.

DR. REDWOOD : I feel that we are indebted to Dr. Wright for having brought before us a subject which is so highly deserving of our very careful consideration. I have not given it the amount of attention that would enable me to discuss the details of the principles of what may be called a new system of chemical sanitation ; but there are one or two points adverted to by Dr. Tidy, in reference to which certainly I feel that we may go with Dr. Wright to a very great extent in admitting that, so far as the duties of the general class of medical officers of health are concerned, the chemical qualifications they possess certainly do not

enable them to perform their duties in a perfectly satisfactory and efficient manner. Dr. Tidy has very properly said that where we can get the two kinds of qualification united in one individual, advantages would result from the combination which would be extremely valuable. I have not had sufficient experience of the matter to say that the large proportion of medical officers of health are deficient in that kind of chemical qualification which is so essential, but it appears to me, so far as I have been able to observe, that in the majority of cases where medical officers of health are called upon to exercise their functions, that the really efficient performance of their duties mainly depends upon the possession of a considerable amount of chemical knowledge. I quite agreed with Dr. Tidy when he said that a medical officer, when he smelt some foul smell, is apt to jump to a hasty conclusion as to its source, and to arrive at a very erroneous assumption as to what should be the best remedy. I can say from personal experience I have found cases in which, unjustly, medical officers of health have condemned certain factories as the source of some foul emanations calculated to do mischief, simply because reliable investigations as to the source of the evil have never been adopted; and although the real emanation has come from an entirely different source, manufacturers have been put to serious inconvenience from a too hasty conclusion being arrived at with regard to the application of remedies. I am quite certain that in the great majority of cases disinfectants are improperly used, and very often carbolic acid is slopped about in a manner not calculated to do any good. It perhaps satisfies the public that something is being done, but that something is frequently done without thought, and without effecting that which is really required. I scarcely know of anything connected with sanitation that is more imperfectly and more wastefully performed than the use of disinfectants.

DR. STEVENSON: Although our best thanks are due to Dr. Wright, I wish the subject had been somewhat more ripe for discussion than it appears to be at the present time. Certainly, a chemical officer, whether he be purely chemical or partly sanitary,

will be a person whom we must expect in the future, but it would be a great detriment to the chemical profession if such an officer were appointed before public opinion is ripe on the subject of chemical knowledge. Public analysts were appointed because the great necessity of having an examination of food and drugs was admitted by the public, and because the pressure of public opinion forced the Legislature to pass an Act for the purpose. But the result of the question not being fully ripe was that there was not a sufficient number of skilled analysts familiar with the examination of food and drugs, and the Act was nearly made a fiasco, partly in consequence of the incompetency of a great number of the officers. Dr. Wright divides public sanitarians into three classes. One of these, the chemical sanitary officer, simply becomes the executive officer ; he is the officer to find out certain unsanitary conditions which are laid down by the sanitarian proper, who is a medical man. If this is to be the case, the chemical officer must be subservient to the medical ; he must receive his cue from the latter, and must necessarily hold an inferior position, not only in the eyes of those under whom he serves, but in the eyes of scientific men. And with all this he is to be a man under whom there is to be an army of sub-officers, and he is to receive a salary amounting to a thousand a-year. I doubt whether there are more than two or three sanitary officers in the kingdom who at present receive salaries as high as this, and not many who get as high as £600 or £800. The consequences of this will be, that if the latter part of the scheme cannot be carried out, the chemical sanitary officer will be paid badly, inferior men will be drawn in, and chemical sanitation will receive its death blow. As Dr. Redwood has remarked, the performance of the chemical duties of the medical officer of health is not always satisfactory, and I think it is the confinement of his attention too exclusively to stinks and nuisances, to the exclusion of the more proper medical aspects of his office, which has brought the medical officer into disrepute and led him to be regarded as a stink doctor. The parish of which I was formerly medical officer of health is a very large one, but has not many nuisances caused by manufacturers, and the nuisances which

arise are not those which demand any great manipulative knowledge. The best medical officer, I think, is not one who performs those superficial duties, which ought to be considered as belonging to the inspector of nuisances; his general duties are those which apply to the cessation and prevention of disease—such disease as can be prevented by the Legislative Acts. As regards stinks from drains or water-closets, the medical officer requires no special chemical knowledge, and therefore a chemical officer cannot be appointed where a medical officer can, as there is but little for the former to do. I am not speaking of special districts, where there are a number of manufactories, for in those cases officers with special knowledge of the Alkali and other Acts should be appointed. Instead of having chemical officers appointed for every district, I think it would be far better if local authorities were to call in the assistance of skilled chemists in cases where the medical officer cannot act, and pay them special fees for special duties. It would be more advisable to have chemists of special knowledge of the matters requisite to be inquired into, than to depute the whole duties to the medical officer. Dr. Wright seems to think it would require the establishment of a special medical department, and he proposes that the Medical Department of the Privy Council should take some of the duties of the Local Government Board, and be augmented into a sanitary department, being further sub-divided into two more, the medical and chemical. But it is doubtful whether such a body would fulfil its functions in the way Dr. Wright claims for it. The bodies appointed to carry out the Food and Drugs Act certainly do not perform their functions in an altogether satisfactory way; not in consequence of lack of powers, but rather in consequence of the dislike to administer them. In all cases the local wants must be considered, and the officers must be appointed by the local authorities, in the same way as the medical officer, and the question of salary and duties would be subject to supervision by the Local Government Board. But in the present state of public feeling such supervision is ineffectual. If we look to the cases where medical officers have been appointed by local

authority, as it often happens these perform their duties better than those appointed by the Local Government Board. I think, however, that by this discussion, we shall clear the way for the future recognition of the chemist in regard to sanitation, although if, under the Sale of Food and Drugs Act, as in the case of the public analysts, a special sanitary officer, a chemist, be called upon to fulfil duties which at the present time he is incompetent to perform, it would be a detriment to ourselves as well as to the public. Until we can go a little further by special sanitary education in the department of the chemist, and until we can point out what are the chemical changes concerned in the propagation of disease, and what those diseases are which originate in such changes, it is useless to go to Parliament and ask that we should be appointed chemical sanitarians.

MR. KINGZETT said, in his opinion there could be no doubt that chemists could discharge sanitary duties quite as efficiently, if not better than, medical officers of health, except in regard to matters requiring a knowledge of the diagnosis of disease. Considering the intimate and essential relations existing between chemical science and matters affecting the public health, he was convinced that chemists ought, in the future, to assume and maintain a very strong and important position before the public. It was quite true that the existing knowledge of disease and its causes was of a meagre and uncertain nature, and hence it was not rare to meet with very many operations intended to combat unsanitary conditions, which had but a scanty, if any, scientific basis. Dr. Redwood had given an instance of this kind, and from his (Mr. Kingzett's) own experience, he might confirm this so far as to say that he believed at least fifty per cent. of the quantity of disinfecting materials commonly used, effected no satisfactory purpose, being used, as they undoubtedly were, without proper judgment. For all this, the chemical study of animal and vegetable matters more intimately concerned sanitary science, and would probably guide its proceedings more than any other branch of science. He was sorry he could scarcely agree with Dr. Tidy as to the view to be taken of chemical teaching in medical schools,

for, instead of this being occupied with animal and vegetable chemistry, it was mainly directed to the mere qualitative examination of substances having no or little connection with medicine and physiology. As instancing the desirability of chemists occupying a more important position in the eyes of the public, and even of other branches of scientists, Mr. Kingzett added that at a recent sanitary congress which he had attended, a civil engineer had expressed the opinion that, since chemists had so utterly failed to distinguish between safe and dangerous drinking water, it was high time the matter was taken out of the hands of chemists and transferred to those of the engineers! This incident shows not merely the necessity of prosecuting chemical researches until the results obtained are beyond dispute by outsiders, but it also illustrated the necessity of the Institute of Chemistry taking means to urge the value of chemical evidence in all questions of sanitation.

MR. GROSJEAN thought that, without waiting for the excellent arrangements sketched by Dr. Wright, chemists might do much to establish a better relation for their profession to public sanitation, and particularly in two ways. First, they might take more opportunities of teaching, not so much the lower, but the higher, classes, the necessity for sanitary measures. He gave two instances of the ignorance and opposition to sanitary measures of these classes which had come under his own notice. In one case typhoid fever had proved fatal in one of the best districts of London. The drains were found to be in a disgraceful state in the whole street, and yet it took a year to induce, not the Vestry, but the inhabitants themselves to put down new drains. In another case a lady had spoken approvingly of a new cure for whooping-cough, which consisted in holding the patient's head over a water-closet, until "the ammonia brought on sickness." The kind of teaching the speaker would wish to see given, could not, as a rule, be given by mere medical men. He instanced one doctor who attempted to test the salubrity of a room by exposing a tumbler of lime-water in it for three hours. The second way to establish a better relation to public sanitation, was by paying

more attention to private sanitation. In the mind of the public nothing could be more unsanitary than a chemist's laboratory, and carelessness with regard to ventilation, &c., went far to neutralise all the advice on the subject given by chemists.

PROFESSOR CORFIELD : I have not had the advantage of hearing the paper, nor of hearing much of the discussion, but so far as I have heard it, it gave me the impression that I was present at a conference of Medical Officers of Health. What we want to know is—What relation is the chemical profession to bear to sanitation ? Sanitation has hitherto done without much chemistry, but the time has come when it can no longer do without it, and it is more necessary every year to see what relations have obtained between the two. It is quite clear there are three ways in which we may look at it. Either certain chemists will take up sanitary chemistry as a specialty, and do little else ; or certain sanitarians will take up the chemistry of sanitary work—and all teachers of hygiene ought to be sanitarians in this widest sense ; or chemists may take up sanitary chemistry with their other work. Speaking generally, chemists are not likely to devote themselves to sanitary chemistry and do nothing else, at present, at any rate ; but there are a large number of men who will devote themselves to sanitary work in all its bearings, without any intention of doing any chemical work but that relating to sanitary matters. Then there are a large number of sanitarians who would do what might be called (for want of a better name) sanitary work proper, and would employ a chemist to be associated with them and to do the chemical work of the department. It seems to me that on the whole it is desirable things should be left to work themselves out naturally, especially as a large number of men, and especially the younger men, are working with a view to take a position not only as sanitarians, but as specialists in certain branches. Such men will not interfere with other chemists, as they will only undertake chemical work in its relation to the public health. They will make it their special object to be sanitarians in the broadest sense of the term. Of course, it will always happen that sanitarians will call in the assistance of expert chemists who do not

profess to be expert sanitarians. There is, however, one thing which occurs to me, that it is extremely desirable from a public point of view, in order that the public may see the advantage of chemistry and sanitary science—I may say of course that the public do not see the advantage of sanitary science, and not only the public generally, but even many so-called sanitarians—it is exceedingly desirable that chemists should be united amongst themselves. It is exceedingly undesirable there should be such widely divergent views as to what is pure water, to take the first example that occurs to me, or what process should be used to determine what is pure water, or that there should be a great divergence in connection with many points of sanitary chemistry. It is quite clear that these differences must be a source of bewilderment, and people will say, if chemists are divided among themselves, let us go on as we have always done; a good deal of sanitary work is done without chemists, let us do without them altogether.

PROFESSOR ATTFIELD: I have been much interested in Dr. Wright's paper, and I go with him in several of his propositions, of which more than one is self-evident. I have also been especially interested in hearing what various gentlemen have had to suggest in answer to Dr. Wright's requests. The Conference has struck me as particularly well showing the advantage of thus assembling together. I have been listening, too, in hope of learning what it is desirable for us actually to do in this matter, that is, whether it would be possible for us to take any action, as a body. The suggestions made by Dr. Wright seem to have two points in view, namely, to endeavour to get future sanitarians so to train themselves as to pass an examination, either connected with some one of the examinations of the London University, or of this Institute; and, secondly, to have a double set of sanitary officers. Dr. Wright takes exception to the University Public Health examination, because it does not include quantitative analysis. I suppose it would be quite within the scope of this Institute to suggest that quantitative analysis should be included in the examination referred to. I think, myself, our own examination

is the more preferable, and we should do what we can towards inducing Medical Officers of Health to pass this examination. It is extremely desirable that chemists should, as Dr. Corfield has said, be united in these public matters. It is to be regretted there is more than one body of analytical chemists in England, and I never cease to hope that the Institute of Chemistry and the Society of Public Analysts may, sooner or later, combine. Dr. Wright also suggests that, in connection with his double set of officers, that a whole army of inspectors should pounce upon unsuspecting tradesmen. Here I cannot agree with Dr. Wright, and I would ask him if such a state of things existed as really to render necessary his army of officers, whether life would be worth living by anybody, but especially by tradesmen. It seems to me, from the paper and discussion, all we can do is to go on doing what we have been doing, that is, prosecute our researches, especially in the direction of improved methods of analysis, for I am not quite sure that all our processes are yet perfect as regards the detection of what adulteration there may be in food, drugs and drinks. As to Dr. Wright's twofold sanitary system, the existence of medical officers of health and public analysts, point to its development in due time. But we must not move too fast. Not only must we beware of nauseating one great section of the public with chemistry, but be careful not to force upon the public generally more chemistry than they are capable of absorbing.

DR. WRIGHT, in reply, said, I do not know if I have a very great amount left to say. Most of the speakers, I think, have agreed that it is desirable that something should be done in the way of producing a greater desire for chemical sanitation in the minds of the public than at present exists. That there is room for improvement in this seems to be admitted, although Dr. Attfield and Dr. Stevenson seem to think that the time has not yet arrived when the chemist should be put forward as prominently as the medical officer. Dr. Tidy considers, and Dr. Corfield agrees with him, that if you can get a man who possesses the qualifications of a medical and chemical sanitarian combined, he is the best man. Undoubtedly, but how many men are there who possess these two kinds of

qualification? Some such are in this room and have spoken to-night, but how many more can be found? It is true that within my knowledge, two or three gentlemen have joined the Institute with the express intention of taking up both chemistry and medicine, and of cultivating both these branches, but these are rare instances. There are several men now going up for a diploma in Public Health in the London University, and other kindred institutions, but if these gentlemen were compelled, in addition to their medical education, to go through a regular curriculum and course of training in *quantitative* analytical chemistry, I do not see how they could well spare the considerable additional amount of time requisite to be spent in the laboratory. In many cases the small amount of analytical chemistry that most students acquire during their curriculum exemplifies the saying, "a little learning is a dangerous thing." Dr. Attfield thinks it is undesirable that anything should be done at the present time in the way of endeavouring to improve the position of chemical sanitation, and Dr. Stevenson maintains that the chemical sanitarian must be subservient to the medical officer. I fail to see why. The canons which guide the administration as to whether such and such a thing is injurious to health, are in many cases as available for the chemist as for the physician or surgeon. There are some things which would require to be dealt with by common sense, others which, I take it, could only be mastered by the chemist, and others which require special medical training. I do not see why the chemist and the medical officer should not be equal in position. As to the impossibility of getting local boards, vestries, and the like, to agree to any such utopian proposals as those I have suggested, I quite think it is eminently improbable. My own experience of such boards is not of the most favourable character, especially in regard to the election of officers by vestries. Great as is the objection to the Government appointing officers, I am not quite sure it is not, on the whole, the best way. It is by no means certain that the best man is selected by vestries, as the successful candidate is often elected, not because he is the best, but because he has taken the most pains to curry favour with the

members by personally canvassing and requesting "to be honoured by their vote and support." I know of a case where, on the banks of a canal, in the heart of a thickly-populated part of London, is a large deposit of refuse, consisting of dust, ashbin contents, and the like. Women and children are engaged in sorting and sifting out the several constituents, broken crockery, cinders, cabbage leaves, &c., and a most offensive odour issues frequently from it, when the refuse portions are from time to time burned, the smell being perfectly diabolical. I inquired what the medical officer was doing to allow such a nuisance, and was told that the reason why he did not interfere, was that, if he did, certain members of the committee, personally interested in the matter, would make it so hot for him, that he would rather not stir in the matter. The question which Dr. Attfield has put—What can the Institute do?—seems to me to be answered by the reply, that it must do its best to bring before the public the intimate connection which chemistry has with sanitary science. As to whether the chemical aspects of sanitation should be regarded as a branch apart from the ordinary duties of a medical officer, and requiring a wholly distinct kind of officer, this is a matter which must be settled by time; and, I take it, that when the want of such an officer is demonstrated to the public, the office will be created. If the Institute thinks that chemistry should have a closer connection with sanitary science than at present, the point comes, how can we best educate the public to the necessities of the case. Mr. Grosjean's suggestions in the matter are, doubtless, very valuable, but I think they hardly go far enough. As to the chemist being called in as consultant, and having a special fee paid him, my experience has shown me that these fees are sometimes remarkably limited in amount. This error of being "penny wise and pound foolish" on the part of the boards appointing chemical officers, such as public analysts, has already led, in various instances, to disastrous consequences. It is often stated that when the Food Adulteration Acts first came into force, a sudden demand for men skilled in food analysis arose, and, the supply of such men being limited, in many cases men were appointed who were hardly

competent for the work, and, in consequence, various mistakes were made by public analysts, and numerous fiascos occurred. This is true enough, but to this should also be added that in very many cases the appointing of unskilled and incompetent men did not arise from the lack of better trained chemists, who, although not at first specially skilled in food analysis, could speedily master the very simple methods requisite, and whose adequate training was in some sort a guarantee against the gross blunders made through utter ignorance, such as disgraced some of the early days of the public analysts, and led to the creation of a popular impression, highly damaging to chemists in general and public analysts in particular. The true cause of such appointments being made was that in many instances a want of appreciation by the appointing authorities of the true nature and value of the services of a competent analyst, led to the offering of such miserable stipends that first class chemists would not undertake or apply for the offices, and, consequently, very imperfectly trained men (often dear, even at the low prices offered) succeeded in obtaining the appointments. Even within the last few months, an application was made to me by a gentleman who was both medical officer of health and public analyst for his district, and who desired to sublet to me his analytical work ; the liberal fees offered to him were that, for every analysis (which was to include water) he was to be paid 7s. 6d. ; his desire was to sublet to me the same for 5s. apiece. If there is any method by which a water analysis, worthy of the name, could be made for the sum of 5s., or even 7s. 6d., I should be very glad to know it.

THE PRESIDENT : In this long and very interesting discussion we have not, after all, met with much difference of opinion. I do not think there is any doubt as to the steady development of sanitary science arising from State interference with matters concerning the public health, notwithstanding all the protests against such interference. Although the applications have been, in some cases, crude, and the results somewhat uncertain, yet I think we must all admit that this action of the State has, on the whole, been beneficial, and the results have shown, contrary to the ex-

pections of some, that good can be thus effected. It has been urged, and with truth, that the average training of the medical man is insufficient for the combined duties of a medical and sanitary inspector, and that there ought to be a division of the duties between a chemical officer and a medical officer. This will doubtless be effected in the future, but in the meantime I agree with Dr. Tidy, that there are many advantages in having the two offices concentrated in one man, so long as we have the present lamentable state of public education. When, however, we do attain to a better state of education, I hope that it will not be necessary to have an army of inspectors to pounce down upon tradesmen, for it may be reasonably expected that the morality of the tradesmen will be thereby improved, so as to render unnecessary any great increase in the number of inspectors. There is no doubt that the inefficient carrying out of the Adulteration Act by inefficient chemists has done more to retard progress in sanitation than all other hostile influences put together. We have arrived then, at the conclusion that it is impossible to have in one and the same man, who is actively engaged in either profession, an officer thoroughly acquainted with the medical and chemical aspects of the question which we have been discussing to-night, and I therefore presume we must eventually come to a division of the labour into two parts, as suggested by Dr. Wright. But I think this division will have to be carried out carefully and with deliberation, otherwise the mistakes made on the appointment of public analysts may again occur. Such a gradual evolution of the special chemical officer will certainly be much more in harmony with what we find going on around us in nature, and it is also in accordance with that great institution which we call the British Constitution. No more certain method of hastening such an evolution can be employed than the better training of chemists for their professional work, and this is one of the chief objects which our Institute seeks to secure. I am sure you will give a hearty vote of thanks to Dr. Wright for bringing this subject before us.

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

THE REPORT OF THE COUNCIL
AND
BALANCE SHEET FOR 1879,
TOGETHER WITH THE
ADDRESS OF THE RETIRING PRESIDENT,
DR. FRANKLAND, F.R.S.

London :
PRINTED BY A. P. BLUNDELL & Co., 26, GARLICK HILL, E.C.

1880.

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C. R. ALDER WRIGHT, D.Sc., F.C.S.

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INSTITUTE OF CHEMISTRY

OF

GREAT BRITAIN AND IRELAND.



REPORT OF COUNCIL.

As at the preceding Annual General Meeting, the Council has again to congratulate the Members on the increasing prosperity of the Institute. At the time of the last meeting there were on the Register 341 Fellows, and 53 Associates, whilst at the present time there are 370 Fellows, and 54 Associates, besides 1 Fellow who has recently been elected, but not yet formally admitted, making in all 425 Members. Three Candidates have been admitted to the Associateship of the Institute, and two who were Associates have passed to the grade of Fellow, so that there is only an increase of one in the number of Associates at present on the Register. During the past year we have lost one Fellow by death, Mr. T. Wills, the Chemical Secretary to the Society of Arts, and two Fellows have resigned. The increase in the number of Members must be looked upon as decidedly satisfactory, considering that the regulations under which candidates are admitted are now so much more stringent than in the preceding year; the thorough and searching examination in practical chemistry which is demanded of Candidates for the Associateship has, for the present, limited the number who have taken the necessary step to qualify for that grade.

One of the two prizes of £50 offered by the President for original investigations involving gas analysis, has been awarded to Mr. Leonard Dobbin, for his research on "Some Reactions of

Tertiary Isobutylic Iodide," which has been accepted by the Council as sufficient and satisfactory evidence of training in practical chemistry to entitle him to the Associateship.

The numerous applications with reference to the qualifications necessary to obtain admission to the Institute, are evidence that the advantages to be derived from organisation amongst professional chemists are more and more appreciated, and this is especially the case with the younger members of the profession. The small number of candidates who have hitherto presented themselves for practical examination would seem to indicate that the chemical student does not usually devote sufficient time to the attainment of a sound knowledge of analytical chemistry; there can be no doubt, however, that the thorough preliminary training required to pass the practical examination now imposed by the Institute as a condition of obtaining admission as Associate, will induce students to prolong the period of study, and to pay more attention to the various branches of exact analysis.

A Meeting was held in February last immediately after the Annual General Meeting for the purpose of considering the alterations in the Articles proposed by the Council, which alterations were carried unanimously. The Members will recollect that the greater number of the changes introduced were for the purpose of avoiding the confusion arising from the manner in which the terms "Member" and "Fellow" were used in the original Articles of Association. As the Articles stand at present, every chemist who has been formally admitted is a Member of the Institute, and is entitled to vote at all meetings, but Associates are not eligible as Officers or Members of Council.

Conferences have been held since the last Annual General Meeting, at which the subjects discussed were:—

"The Adulteration of Food,"

"The Relations of the Chemical Profession to Public Sanitation," that on the Adulteration of Food occupying two evenings. These meetings have been so successful hitherto, that the Council has decided to continue them. It is a matter of regret that the great body of the members of the Institute in the provinces cannot

attend these meetings and thus have an opportunity of taking an active part in the discussions; but, in order to obviate this difficulty as far as possible, it has been decided to print the paper which forms the subject of discussion, and circulate it amongst the Members some time previously, so as to afford those who reside away from London and cannot attend the meetings, an opportunity of forwarding to the Secretary any remarks they may desire to make, which can then be read at the meeting. It was also thought that this step would give Members an opportunity of carefully considering the subject before the meeting, and thus facilitate the discussion.

A Parliamentary Committee has been appointed, whose business it is to watch over any Bills which may be brought forward in Parliament which may concern the chemical profession, and to call the attention of the Council to any which they deem likely to affect the interests of the Members of the Institute. Negotiations with the Pharmaceutical Society are pending for the alteration of the clauses in the Pharmacy Act which restrict the use of the title of "Chemist" to those registered under that Act, in the event of any amendment of the Act being brought into Parliament.

One of the two prizes of £50 each, offered by our retiring President, Professor Frankland, for "The best original investigation involving gas analysis," still remains to be awarded. Dr. C. Meymott Tidy has also offered a prize of £25 for the best original investigation on "Special Reactions of the Alkaloids, and their Separation from Organic Mixtures." These prizes are open, not only to Associates, but to all persons, except Fellows of the Institute, who shall before the 31st December next, have qualified themselves for the Associateship in all respects short of passing the prescribed practical examination, and the Council has decided to accept successful competition for these prizes in place of such practical examination.

The Institute is again indebted to the President and Council of the Chemical Society for the use of their rooms during the past year.

INSTITUTE OF CHEMISTRY OF GREAT BRITAIN AND IRELAND.

STATEMENT OF ACCOUNT AND BALANCE SHEET,

FROM 1ST JANUARY TO 31ST DECEMBER, 1879.

Cash in hand, Jan. 1, 1879 ..	£	s.	d.
Balance in London and Westminster Bank, 1 Jan., 1879 ..	365	19	3
17 Entrance Fees at Five Guineas..	89	5	0
1 " " at Two Guineas ..	2	2	0
Life Compositions ..	45	3	0
283 Fellows' Subscriptions ..	593	5	0
47 Associates' " "	49	7	0
Interest on Consols ..	642	12	0
Examination Fees ..	44	1	3
	10	10	0
	£1207	3	8
Assets.			
31 December, 1879, Cash in hand..	£293	19	6
" " £1350. 3 % Consols.			

Printing, Stationery, and Postage ..	£	s.	d.
Advertisements ..	128	9	2
Rent, Office, and Miscellaneous Expenses	96	18	6
Examiners' Fees ..	90	12	4
Salaries and Wages ..	15	15	0
Law Charges ..	180	18	0
Purchase of Consols ..	34	4	10
Cash in hand 31 Dec., 1879 ..	356	6	4
Balance in London & Westminster Bank, 31 Dec., 1879 ..	£1	1	8
	292	17	10
	293	19	6
	£1207	3	8
Liabilities.			
31 December, 1879 ..			None.

FREDERIC JAS. M. PAGE,
JOHN SPILLER,
JOHN M. THOMSON.

*Somerset House Terrace,
London, W.C.*

PRESIDENT'S ADDRESS.

DR. FRANKLAND said: You have heard the Report of your Council and the Financial Statement of our Treasurer, and I think you will agree with me that they are both eminently satisfactory. We have, on the year, an increase of upwards of 30 Members, and our income has exceeded our expenditure by some £277. Three years have not yet elapsed since the draft scheme for this Institute was laid before the Organisation Committee, when a Sub-Committee was appointed to take all necessary steps for our incorporation, when the names of 48 chemists were added to those of the Committee, and when the first Officers and Council were elected. Many obstacles had still to be overcome before the incorporation of the Institute was accomplished seven months later; and at the first annual general meeting, two years ago, only 225 Fellows had joined the Institute. To-day we have an aggregate of 425 Members, consisting of 371 Fellows and 54 Associates, a number which the Chemical Society had not attained before its twenty-third anniversary.

The mere number of our Members, however, so far from being a subject for congratulation, might be one to be deplored if a strict investigation of the qualifications of candidates for admission had not been maintained. By lowering our standard we could, doubtless, have doubled our numbers, but this would have been to forego the essential object of the organisation—the guarantee that consulting and analytical chemists are duly qualified for the proper discharge of the duties they undertake. An inspection of our Register will, I think, convince you that your Council has fairly effected a separation of the competent from the incompetent members of the chemical profession, and although there are some practising chemists of eminence whose names we should like to see enrolled in our list of Fellows, it is satisfactory to know that their number is very small. The period during which they can be admitted under the provisional regulations is now rapidly drawing to a close, for, after the 2nd of October next, no one can,

by the Articles, enter our body, either as a Fellow or Associate, without first passing the prescribed examinations. It is, therefore, desirable that our Members should use their influence to bring in those few competent chemists who may, from one cause or another, be still unattached to the Institute, for it is evident that the existence of obviously competent professional chemists outside our organisation will be a source of confusion to the public, and will tend to lengthen the time before Membership of this Institute will be considered to be as essential to the practice of chemistry, as are the corresponding badges of competency in the professions of law and medicine.

In my own individual experience as a teacher of chemistry, I find manifested amongst students, and especially amongst the better class, a continually increasing interest in the Institute; and I know, at the present time, many students who are undergoing special training for the Associateship. But the objects and advantages of the Institute are not patent to everyone; there are no popular developments of our functions, we have no journal, we have not hitherto enjoyed much notice from the Press, and we do not even hold any public meetings. Indeed, it would be contrary to our principles to push ourselves into notice with the object of adding to our numbers; but it is, therefore, all the more necessary that our *professorial* members should bring the Institute under the notice of their students, encouraging them to prepare for admission to the Associateship; for, by so doing, they would not only be contributing to the elevation of chemistry as a profession, but also to the better education of chemical students in general; since the training prescribed by us in theoretical and analytical chemistry, physics and mathematics, with incentives to original investigation, is precisely that which is necessary for all competent chemists, whether professional or professorial.

It should never be forgotten that the paramount function of our Institute is the *registration* of trained chemists competent to undertake the investigation of the various problems which arise in ever increasing numbers in connection with the applications of

our science to the Arts, Public Health, Agriculture and Technical Industry; and the *publication* of this Register in such a manner as to bring it to the notice of Government Departments, Boards of Health, Public Sanitary Authorities, Manufacturers, and others who require the aid of chemical experts. But there are other subsidiary functions incumbent upon us of no small importance; amongst these are watchfulness of such legislation as is likely to affect our body, and, secondly, the cultivation of professional ethics and good fellowship by the holding of Conferences for the discussion of questions arising out of the practice of our profession. Since incorporation, our Parliamentary functions have not had many demands made upon them, but the Conferences on "Trade Certificates," "The Adulteration of Food," and "The Relations of the Chemical Profession to Public Sanitation," have excited much interest amongst our Members, and the reports of the Discussions have no doubt been very useful as means of interchange of opinions on the subjects treated of.

Valuable suggestions for the utilisation of the Institute in other directions have been made from time to time, and probably some of these will ultimately be acted upon; but, as they involve the expenditure of considerable sums of money, they should be undertaken with deliberation and caution, for it behoves us, at the outset of our career, to practice strict economy. We may at any moment be involved in Parliamentary or legal proceedings; these are, of course, very costly, and our power for good in connection with them will be very much in proportion to the amount of our investments and the balance at our bankers. Much of our ultimate success in winning due recognition for the Institute, will depend upon our steady accumulation of capital, and I consider it, therefore, a very fortunate feature in our present position, that the current expenses are so moderate. Thanks to the hospitality of the Chemical Society, we are rent free; most of the work is done without remuneration, and our chief outlay is incurred in the performance of that most important function, the printing, advertising and distribution of our Register.

Our present position may, therefore, be thus summarised. We have as many competent members as we could hope to extract out of the general mass of professional chemists, our finances are in a flourishing condition, our standards for admission are as high as the scientific training in our schools and universities will allow, the Register of our Members is annually put into the hands of those who are in the habit of resorting to the aid of professional chemists, and there is every reason to hope that the influence and progress of the Institute will be no less satisfactory in the future.

INSTITUTE OF CHEMISTRY.
OF
GREAT BRITAIN AND IRELAND.



R E P O R T

OF
A C O N F E R E N C E

ON
WHAT SHOULD BE THE RELATIONS OF
PROFESSIONAL CHEMISTS TO EACH
OTHER, TO THEIR CLIENTS AND TO
THE PUBLIC IN LEGAL CASES?

Held Friday, February 20th, 1880.

London :

PRINTED BY A. P. BLUNDELL & Co., 26, GARLICK HILL, E.C.

1880.

INSTITUTE OF CHEMISTRY.

ABSTRACT OF PAPER

BY

MR. WILLIAM THOMSON, F.R.S.E.,

FORMING THE SUBJECT OF THE CONFERENCE,

On Friday, February 20th, 1880.

WHAT SHOULD BE THE RELATIONS OF PROFESSIONAL CHEMISTS TO EACH OTHER, TO THEIR CLIENTS AND TO THE PUBLIC IN LEGAL CASES ?

IN bringing this subject before the Institute of Chemistry, I cannot do more than propose certain important questions for discussion by the Members, which I trust may receive their deliberate consideration, so that at some future time, the principles of action which should be adopted under certain conditions in which professional chemists are called upon to act, may be referred to, as precedents for their guidance; for there is no doubt that if this Institute is to hold the position towards professional chemists which the Medical Council holds towards the members of the medical profession, such questions must be discussed by the members as soon as possible. In this way a code of etiquette,

which the members of this Institute would be morally bound to hold towards each other and towards the public in general, might be framed, which would tend to raise our profession in the esteem of the general public.

The members of our profession who are placed in the position of being required to give evidence in legal cases in which chemistry, or rather science generally, is involved, must have been occasionally struck with the want of respect shewn by some judges towards scientific evidence, and with the not uncommon popular remark that scientific men can be got to swear to anything. It must be obvious, then, that unless some clear understanding exist among chemists as to their duty towards the public and towards themselves, we shall not improve our position in the eyes of the outside world.

With these remarks I will propose the first question for discussion, viz :—

Is it, or is it not, right that a professional chemist should act the part of an advocate in his client's cause? or, to put it in other words, should a professional chemist act truly and impartially as a judge, and give his unbiassed opinion, or should he strive by all the devices in his power to uphold the side of his client, even if he be in the wrong; and throw obstacles in the way of eliciting the true facts of the case, which can often be done successfully, even when the substantial facts are clear beyond all doubt to the scientific men engaged.

It seems to me highly important that this question should be thoroughly discussed by the members of this Institute, because I have known chemists who seemed either undecided on the matter, or were clearly of opinion that it was right and proper for them to act as advocates in the discussion of scientific questions in Courts of Law. I do not mean to say that there is not some plausibility in the idea of allowing scientific men to act the part of advocates, so as to lay all the facts in favour of each side before the judge who has to discriminate between them, but, as Dr. R. Angus Smith remarks in an able and thoughtful paper upon this subject, read before the Society of Arts, "We can listen to the barrister

using as tools the interests and feelings of men, and moulding them to his purpose, but we stand aside from a man who twists the expression of natural law for his own interest, as from one who, before his eyes, has neither the fear of God, nor the love and admiration of nature"; and I think it must be admitted that the proper sphere of a scientific man is that in which his mind is kept as a delicate balance that he may be able to elicit facts and results clearly and honestly without looking beyond as to what influence these facts will have.

I believe that if due consideration be given to this subject, the large majority of the Members of this Institute will agree with me in saying that the position of a professional chemist in regard to all questions submitted to him, should be that of a judge, and that an unbiassed opinion should be given without the slightest regard as to whether that opinion is or is not favourable to his client's case.

To carry out this principle rigidly, it would often be necessary for the chemist to explain clearly to the defendant or plaintiff in any action, before the scientific investigation is commenced, that he will act in a perfectly unbiassed manner in giving his opinion, because a considerable section of the public is under the impression that a scientific man should uphold or condemn anything to order, if he be paid for it. It often happens that commercial men hold the most erroneous opinions on scientific questions in which they may happen to be interested, and then, if their scientific adviser agrees with them, he is forthwith held in esteem, but if, on the contrary, he should happen to disagree with them, he is at once regarded as incompetent.

There is, I believe, a distinct demand for the services of scientific advocates, and it remains to be seen whether this Institute as a body, will, or will not, approve of their Members supplying that demand. On the other hand, it is not my opinion that the scientific men who oppose each other in legal cases, at all events in the large majority of them, do so dishonestly. The sense of honour of those engaged in our profession is certainly as high as that shewn by those of any other profession, but the

difficulties which they have to encounter to avoid supporting, and the temptations to support, the views of their clients, rather than to investigate with a determination to give an unbiassed report, is very great, and if it seem to you desirable that such difficulties should, as far as possible, be overcome, it might be well to consider if any means can be taken to prevent as far as possible the clashing of scientific evidence in Courts of Law.

First, then, with regard to the question, as to whether it is desirable that the clashing of scientific evidence in legal cases should as far as possible be avoided. If we consider the legal cases within our knowledge which have depended for their decision mainly on scientific evidence, we must be satisfied that most of them depended on the correct answers to questions which were answered by the one side, *yes!* and by the other side, *no!* and it thus devolved on the counsel and judges, who usually know little or nothing about science, to decide between this antagonistic evidence, as to what was correct, or rather which side appeared to be speaking the whole truth, and which did not. Surely this is an unsatisfactory state of affairs, and such a controversy usually casts discredit upon our profession. That questions should be discussed in open court at enormous cost to the country and to the litigants, without much hope of a thoroughly satisfactory solution, and which might be conclusively decided by a few experiments or quantitative determinations in the laboratory, seems equally strange and absurd. That the odium of this state of affairs generally falls upon the heads of the scientific men engaged, and injures their reputation, cannot be doubted; and yet in the majority of these cases, the scientific man cannot be held to be responsible by those who understand the real position of affairs. Litigants, as a rule, are very anxious that their opponents should know as little as possible about their mode of attack or defence, and solicitors almost invariably desire that their case should only be known when it comes before the Court; hence it is, that chemists of the highest standing often give evidence which they would not have given had they known all the facts of the case previously.

Two chemists may work at the same thing, each for the opposing litigants, with a view to get an honest result, or form an unbiassed opinion, and may arrive at contradictory conclusions, each being in favour of his own client; if, however, these chemists were to meet and compare results, it is probable that the one would be able to point out weak points or fallacies in the arguments or processes of the other, and it is not unlikely that a few minutes' discussion of this kind would in many cases settle the scientific point of difference, and the legal points hinging upon these facts might then be left to be dealt with by the Court.

The arrangements at present in existence are not very favourable for eliciting straightforward scientific evidence in Courts of Law, but it seems to me that a very slight alteration in the present system would give the best possible results, and that is, that the scientific witnesses engaged on the opposing sides should compare the evidence which each has obtained, and join issue as far as possible on all the important facts of the case, make further experiments, if necessary, and ultimately draw up a joint report leaving the points upon which it is found impossible for them to agree, to be considered by the Court along with the actual facts which have been admitted by both sides. This course would generally simplify matters, it would save the time of the Court, and would, as a rule, produce evidence giving the facts directly as far as they can be obtained; the points of difference, if any, between the scientific men, on the opposing sides, might then be clearly stated and subsequently discussed by the Court. It would be necessary, under those conditions, that no scientific evidence should be admissible in Court by a litigant, unless he had previously laid it clearly before his opponents, the plaintiff being required to take the initiative. This might be done in writing, and the defendant's reply made in writing; but, better still, the scientific witnesses should meet, discuss the questions at issue, and draw up a joint report.

I will then, with your permission, proceed to consider the question, whether it is desirable, with a view of avoiding, as far as possible, unseemly clashing of scientific evidence, that steps

should be taken to bring this matter fully before the Members of this Institute.

The mode which I have pointed out, with a view to prevent as far as possible, the clashing of scientific evidence in Courts of Law, may be considered unsatisfactory by some members, as it may possibly have the result of offending their clients, and depriving them of fees which they otherwise might have had, but this is surely a narrow-minded view of the matter. When the members of our profession come to be regarded generally as men of the highest honour, many cases would doubtless find their way into their hands for settlement which otherwise would be waived, owing to the tremendous costs which a law suit under the present system involves, or settled by a small payment out of all proportion to the actual claim.

There are, however, cases where *opinion* and not fact is in question, and in which it seems to me right that scientific men should appear against each other to show the judge, or those who have to decide the question, the two scientific opinions, and the facts upon which they are based.

In the Medical profession, it is not considered etiquette that one medical man should expose the ignorance, incapacity, or carelessness of another to his patient. I would ask you to consider the question, whether any such code of etiquette can be established among professional chemists, and, if so, whether it is desirable to do so? If two chemists make contradictory reports on the same thing, what is the course to be pursued? it seems to the casual observer that one must be wrong, and thus the reputation of our profession is more or less injured, but I would suggest that something can be done to reassure the outside world in the actual power of our science, even if one of its representatives should, in a weak moment, give a wrong opinion or result, and that is, that the one chemist should write to the other explaining the circumstance, and allow him, who has been in error, to retract his report, or that when contradictions prove to be only apparent and not real, he should make such an explanation as will satisfy the mind of

his client. If this is not done, each chemist may endeavour to prove to the mind of his client that he is right, and probably each will be quite successful, especially if he should agree with his client's peculiar whim; still chemistry, looked upon as an exact science, must clearly suffer in public opinion from such contradictions. There can be no doubt that it is to the interest of each individual member of our profession to be as careful as possible, when giving a report upon anything, and, at the same time, to avoid as far as possible any disagreement in the results.

Various methods have from time to time been suggested of having scientific judges, scientific juries, scientific counsel, and the like, but I agree with the opinions expressed by Dr. Angus Smith, that such plans are not practicable. Judges are gentlemen of high and general culture with minds trained to receive and deal with facts of any kind, scientific or otherwise, and if a scientific man is of opinion that the facts which he has to lay before a judge or jury are so intricate that neither will comprehend them, I think no clearer proof is necessary of his inability to understand them himself. As to scientific counsel, it is clear that if a man has had some scientific and a good general education, he will deal with any questions in science quite as well as, or better than, the purely scientific man. I have seen a suggestion to the effect that a jury, to consider a scientific question, should be composed of twelve men, one half of whom should represent two distinct sciences, and the other half two trades or businesses; but it is evident that such a combination would not form a workable committee to decide scientific questions. The true sphere of scientific men in Courts of Law is as witnesses in which their scientific opinions may aid the judge or jury in arriving at a decision, but where in almost all cases, other questions have to be considered, which, although not scientific, are often of the greatest importance,

THE PRESIDENT: Before beginning the business of the evening, allow me to express to you the high appreciation I feel of the honour done me by your having placed me in the position of your

President. I feel strongly that you might have made a wiser choice by selecting from among you one more intimately connected with the subjects with which this Institute deals, and associated with the interests you desire to foster. But I do feel conscientiously that I have earnestly endeavoured to do the best in my power to promote the objects of this Institute, and as you have been so good as to place me in this high position among yourselves, I shall, I assure you, work assiduously in its interests. The question which has been brought before you this evening through the medium of Mr. Thomson's paper, is certainly to Fellows of this Institute one of very considerable importance. It is one which must have engaged the serious attention of all chemists who have been engaged in giving evidence in Courts of Law. It, however, involves several points upon which it may be difficult to arrive at a dispassionate conclusion. I doubt whether even those among us who have had very great experience in Courts of Law, will be in a position to express a decided opinion on some points touched upon in the paper, or which may have suggested themselves to us in considering our position in reference to our clients, and to the judges and juries whom we have to advise and to assist in arriving at a just decision. I confess I feel a little doubtful whether in more than one discussion we should arrive at any thing like a definite conclusion in some important points connected with this subject. At the same time, it is useful to talk these matters out among ourselves, and this I conceive is our desire this evening. We can have no wish to impart into the discussion any personal questions, and although it may be difficult in dealing with the subject entirely to avoid such matters, I hope it will not be impossible so to do. Mr. Thomson's paper having doubtless been perused by those present, I would ask you now to let us proceed to discuss the subject, by taking simply as our starting point the question at the head of the paper, which appears to me to be at the root of the whole subject, namely,—What should be the relations of professional chemists to each other, to their clients, and to the public in legal cases? If we adopt this course, I think we may hope that some gentlemen who have had great experience of professional

duties connected with legal matters will give us the benefit of their views, and so aid us in arriving at some practical conclusions, I would ask our former President, Dr. Frankland, as his time is limited, and as your former President, to be the first to favour us with his views on the general question.

DR. FRANKLAND: I feel very strongly the difficulties surrounding this subject, and to which our President has alluded, and having only read the paper superficially, I hardly feel competent to respond to the invitation to open the discussion. The subject is indeed so important, and at the same time so difficult, that its introduction at so early a stage of these Conferences is perhaps to be regretted. The question, what should be the relations of professional chemists to each other in legal cases? has often presented itself to my mind, when I have been concerned in such cases. On the whole, perhaps, the relations of professional chemists to each other in this respect, are not unsatisfactory. In all but comparatively few cases within my experience, the chemist, in giving evidence before a legal tribunal or Parliamentary Committee, does regard the dignity of his profession, and does not voluntarily cast a slight upon his professional brethren. But there are occasionally instances in which this regard for the profession is not so prominent as it ought to be. It is to be hoped, however, that such carelessness will never occur where members of this Institute are concerned. Even in the case of chemists who may not belong to our body, I think it is very much to be desired that all unnecessary adverse criticism before the public would be better avoided. Of course it will occasionally happen that a witness is compelled to contradict the opinion of a professional brother, or to criticise adversely his analytical results; but this unpleasant duty should always be done with the utmost tenderness and delicacy. If you notice the conduct of witnesses belonging to other professions, you will find that such disparaging statements are very rarely made. They occur, I fear, rather more frequently among chemists than among the members of other professions; but it is to be hoped that even among chemists they will become rarer and rarer every year. They are no doubt fostered by the

counsel engaged on each side, whose business it often is to make these experts contradict each other. But a chemical witness ought to be on his guard, and not allow himself to be led into statements of this kind, unless they form an essential part of his evidence. The author of this paper suggests that the chemists upon both sides should meet before the case is brought into court. There would doubtless be many advantages in such a proceeding; but I fear under the present system of dealing with these cases, both before legal and Parliamentary tribunals, this suggestion could only rarely be acted upon. Much may be done, however, by the chemists on each side, putting themselves as far as they can in the position of those on the other side, and considering what would then be their view of the question. Such a practice would certainly tend to make their evidence come nearer to that impartiality which ought to distinguish it. I think more might be done in this direction than is at present accomplished. According to our present mode of judicial investigation, the witnesses on each side are only permitted to take a partial view of the case; they are not allowed to look at the subject all round; but are almost compelled to confine their attention to one aspect of the case only. The witness ought however to try as far as possible to get acquainted with both sides, so as to make his evidence as fair and impartial as possible. But where important discrepancies do unfortunately occur, it is very desirable to refrain from unnecessarily exposing the errors which have, in your opinion, been committed by your opponents. This may be done without in any way interfering with the ends of justice. The imputation of motives to your opponents is quite inadmissible, and is worthy of the strongest condemnation. In most cases, discrepant results are capable of explanation by a few words, which would go a long way towards preventing the shock to the public which the apparent irreconcilable contradictions of scientific witnesses often produce. I think the introducer of the subject has rightly assigned the first place in his title to the relations of professional chemists to each other, because it is in this relation that progress and enlightenment are most urgently needed; for I have never noticed on the part of

chemical witnesses any lack of zeal for their clients; but, on the other hand, the interests of the profession are, it is to be feared, sometimes too much lost sight of in these forensic struggles. No doubt professional chemists ought to do their best for their clients by giving them advice; but they ought never to be betrayed into distorting the results of their experiments, or into giving an opinion not fairly warranted by facts. The relations of professional chemists to the public, open a very wide question, and I hardly know in what sense the author of the paper intended it to be taken. I think the public has a right to expect that a scientific man should found his opinions on facts; should give his evidence in a straightforward way, and especially with more certainty and precision than is generally the case with ordinary witnesses. The chemist ought to try to put his statements and opinions forward in such a way, as to impress the outside public with the fact that there is really something true and definite in scientific investigation, far beyond that which can usually be obtained in purely legal, or even in medical investigations. These are the only remarks that suggest themselves to me at the present moment. The subject is one that might well be brought before us on a future occasion. It deeply affects this Institute, and deserves to be taken in two or three separate divisions, so as to enable us to discuss it thoroughly.

DR. VOELCKER: I hope the observations of Dr. Frankland will make the impression which they ought to do. I fully agree with every word he has expressed, and, in addition should like to allude to some other points which present themselves to my mind in discussing this matter. Perhaps the best proof of the unpleasant position of scientific witnesses, and the personal inconvenience which many of our true-hearted and most accomplished chemists feel in legal cases, is their reluctance to appear in the Courts of Law, especially in a minor court, where the lines of courtesy are not so strictly observed as before Parliamentary Committees, or in the higher Courts of Chancery or Justice. Even there, I would suggest to all the members of this Institute, to observe the lines of strict politeness and general

courtesy. I remember not many years ago, in a case in the Rolls Court, the Master of the Rolls lost patience with the scientific witnesses, and expressed himself something in this way: "Well, gentlemen, I do not pay the slightest attention to what these chemists tell us." That was not a pleasant observation to make; but he went on to say, "We lawyers have the reputation of pitching into each other as occasion may present itself; but we do so in a gentlemanly way, and not like these chemists, who attack each other in a most reprehensible manner." That was not a pleasant observation to make either, and still less pleasant was it to listen to it. I feel, however, there was some truth in the statement, although it was expressed rather harshly; and it is merely an example of the fact, that the laws of courtesy and gentlemanly conduct are not always observed by chemists. If we want to raise our profession in the eyes of the outside public, I venture to suggest, that if your facts are correct, they will speak for themselves very much better than any reflection on the character, or the want of ability, on the part of your opponent. Another point,—the practice of prompting counsel. This matter, I am afraid, is sometimes carried on in a way not very reputable to the prompter. It is all very well, and often necessary, to have an experienced chemist sitting behind a counsel, to direct his attention to material points of fact, or to omissions or errors in the evidence of a scientific witness; but to suggest to counsel catching questions, with the view of confusing a witness, is most objectionable. I think no member of the Institute ought to lend himself to act the part of prompter in this way. The author of the paper says that the position of a chemist in regard to questions submitted to him should be that of a judge; now I should be very sorry to act as a judge. My position, I take it, is not that of a judge, but of a witness, whose sole duty it is to give truthful and straightforward evidence: whether the evidence be acceptable or not to his client, does not concern the scientific witness. His duty is to testify as to facts, and to express an opinion as far as he is able to do so; but to act as a judge, would require him to sift the evidence. Now we have nothing to do with sifting evidence. Nor does it appear to me

desirable that the chemists on both sides should meet and compare results. I think such a thing would be most objectionable. A chemist should rather avoid talking about the case in which he is engaged. It is of course impossible to get a right idea of any subject without looking at it on all sides, and to weigh the evidence which may be given for, or against, a matter in dispute; but this is not the business of the scientific witness, but that of the jury, who have to decide how much force or truth there is in the evidence of the scientific witnesses engaged on both sides, although I do not believe a chemist of repute would say what he knew to be untrue. If you were to discuss this matter among yourselves, you would form a court of arbitration, in which case I see no objection to refer a dispute to a number of chemists, with a request to issue a joint report, but that is a different thing from the usual legal proceedings, and in such cases, I do not think it is wise to discuss the matter with, or even to allude to it in conversation with your opponent. My view of the matter is, that when chemists are engaged in legal cases, they should simply act as truthful and straightforward witnesses. If anything is withheld from them by their clients, it is sure to come out in the cross-examination. If a chemist is jealous of his reputation as a truthful man, he will not fence with a question that is put to him in cross-examination; but will just give his evidence whether it suits his client or not. I do not care if my evidence goes against my client,—that is for him to consider; I give him fair warning, and I always tell him,—if your case is not a good one, you had better go to somebody else.

MR. HEATON remarked that there were two occasions on which a consulting chemist was bound to be impartial, when he was advising his client, and pointing out to him the strong and weak points of his case, and when he was giving evidence in court. At other times he might to some extent play the part of an advocate, and assist his client as much as possible. It was a mistake to compare the scientific witness with a counsel, inasmuch as the latter was not sworn, and was not supposed to be impartial. It was equally a mistake to assign judicial functions to him. His duty in the witness box was to answer questions as directly as

possible, and without fencing, but not, as a rule, to volunteer evidence. If led too far during cross-examination, he must trust to the counsel on his side to set him right in re-examination. In fact, the guide of a scientific man on such an occasion, was fixedly his own conscience, and an English gentleman would not be likely to go far astray.

MR. HOWARD said, that in watching the course of scientific evidence in some cases, it had struck him that a confusion in the minds of some scientific witnesses between matters of opinion, and matters of fact, was a cause of their difficulties (as an example, in an assay of silver by weight, it is true that the weight of the button is a matter of fact, and involves no matter of opinion; but, in even so certain a method of indirect analysis as the wet assay, the result is an induction from the observed facts, and, so far, a matter not strictly of fact). Of course very many of the best methods of analysis involve far more complex induction, and in many there is a possibility of errors in judgment; so that the conclusions derived from his results are, however certain they may be to the chemist, matters of opinion, and not matters of fact.

It appeared to him that many of the harsh strictures against the chemical profession that were indulged in by some judges, arose from this confusion between fact and opinion. A judge was always extremely jealous of any opinion except his own, and the chemist should be careful to distinguish between his position as an expert and as a witness to matters of fact.

The chemist should also remember, that although out of the witness box he may do all he can to assist his client, in the witness box he must merely tell the truth. It was no doubt very tempting to be an advocate rather than a witness; but scientific men should train themselves to avoid a bias which may unconsciously prevent them telling the truth.

MR. SIEBOLD: I believe that if the conduct of scientific witnesses in general were investigated, it would be found that chemists compare favourably with the members of other professions with regard to their truthfulness and conscientious tact in giving

evidence. . No doubt, cases do occur in which a temporary confusion of ideas during cross-examination, or natural excitability, leads a witness to statements which do not bear strict scrutiny, and which, under other circumstances, he would not make ; but cases of this kind cannot be said to be confined more to one profession than to others. Instances of false statements deliberately made, and of misrepresentations arising from professional ignorance or recklessness, are fortunately very rare among chemical witnesses, and where such occur, it may be hoped that the organisations of professional chemists now in existence will know how to deal with the offenders.

As regards the question of the propriety of chemists to assume the functions of advocates, I feel sure it would be most undesirable to establish that practice. The more strictly a scientific witness confines himself to a clear exposition of the results of his investigation and their direct bearing on the case, the more creditable to himself and the more valuable to judge and jury will his services be.

On the whole, I believe, professional chemists occupy a high position in the estimation of judges, juries, and the public at large, a position which, I doubt not, they well know how to maintain without requiring any rules to be laid down for their guidance.

MR. HEWITT : I think the object the Council had in view in the promotion of this subject is one that deserves our support—that is, the raising the status of professional chemists and advancement of their moral and scientific reputation. We may very well judge from the action that has taken place in other professions that there are certain individuals who are termed “black sheep ;” we know of the glorious uncertainty of the law, of the “rascally attorney,” of the “unscrupulous advocate.” But there has arisen in these professions a sort of unwritten code of moral law which is regarded by all as a general rule of guidance. I believe that it is one of the objects of this Institute to develop this idea and to gradually form a code of moral conduct on the part of professional chemists. I have had the painful experience of being in a

Court of Law and of standing in the witness-box, and I can quite sympathise with any one placed in that position with counsel trying all they can to place him in a difficulty. I have felt for the professional gentleman who in a recent case, when the judge did not understand the different names of the substance treated upon, asked him to call it by one name as he did not understand it by its aliases. I quite agree with the remarks which have fallen from some speakers about the distinction which must be drawn between facts and opinion. In reading over the paper, however, it struck me that the writer did not properly distinguish between science itself, which is of course perfectly certain, and the fallible interpreters of science. If we knew what was truth, and if our judgments never went wrong, we might assume this high tone; but, in the present state of our knowledge, we ought to go into a case with a certain amount of humility. I think in this respect we ought to be very careful not to assume an infallibility which really does not belong to either side. For my own part, I think the chemist has to do his duty to his client as soon as he accepts the position of advising him. He must not forget, in the anxiety to be upright, that he is bound to do the best he can for his client just as a doctor is bound to do the best he can for his patient. At the same time it is very necessary—and I think we can do that—that we should not impute personal motives to the scientific witnesses on the other side. This is one great matter which scientific witnesses have to guard themselves against. The unfortunate fact is that every man is naturally desirous to win, and this feeling may bias his judgment, and if he wishes to do what is right he must allow a certain amount of discount for his own feelings. I do not believe I ever saw a barrister, a solicitor, or a scientific man who did not wish to be on the winning side of the case. With respect to scientific witnesses, I have observed, that when a man steps out of his proper sphere he very often does injury to his client's case. I saw a case where the advocacy of the scientific witness was so apparent to the judge, that when, after the affidavits on both sides were shewn and the usual cross-examination was over, the scientific

witness for the plaintiff applied to be heard again and introduce new facts, the judge said he had formed his own opinion and declined to hear him further. This is a case in which the chemist defeated the object in view. With regard to prompting counsel, I may say that where a barrister, from want of knowledge or from some other cause, had failed to grasp the bearing of the evidence or had never reached the point desired to be brought out, the question arises how far is the chemist to abstain from prompting? I think if in such cases the chemist were to neglect to prompt counsel he would be neglecting his duty to his client. Although I am not myself a professional chemist, I have thought it right to make these few remarks. I am a manufacturing chemist, and have to employ professional chemists, and to follow from the experiments in the laboratory the working of a large manufacturing concern. I may relate you one special case which shews how easy it is for a chemist to err in opinion where the facts, or some of them, are undisputed. The case had reference to some cloth that had been sent out to India and found to be "faulty" and some of the pieces came back in the course of some months, with certain stains upon them. They were submitted to some scientific gentlemen who said they were stains produced by mildew. They were brought to our laboratory and we also believed they were mildew. The question then arose how did the mildew come? The statement was made by the merchant abroad that they were sent out in an unfit state and improperly bleached, and in consequence of this the cloth was spoilt, and the merchant thought he had a claim against us. There was no dispute about the scientific facts of the case, but there was every room for difference of opinion as to the cause of the mildew and the person to blame. The scientific adviser of the merchant thought it was due to faulty finishing on the part of my firm. We thought differently, as we held samples of the cloth that had been kept dry and were not mildewed. The question of liability was agreed to be left to arbitration, and when the pieces were brought from the warehouse in turning over the plaits of the cloth inside the laps we came upon the words "damaged by fresh water." It *was* mildew, and

arose, as the words shewed, not from any neglect on the part of the bleacher, but from the action of the water to which the cloth had been exposed in India. In this case it shews that had these simple words not been written by some person in the laps of the cloth, an injustice might have been done to the bleacher or the manufacturer.

MR. FRISWELL: I feel a diffidence in speaking on this subject, as it is one upon which I have not been personally engaged. Like Mr. Howard, however, I have paid considerable attention to the evidence given by scientific witnesses, and I think after what has fallen from many of the gentlemen who have spoken, it appears that the scientific witness is certainly apt to take upon himself the office of judge more often than they are inclined to allow, because it seems that a point of personal bias must always enter into the evidence more or less. Chemists, after all, are simply men, and we all of us wish the side we are engaged upon to win. Very likely this feeling may act with considerable strength upon a comparatively young and inexperienced man engaged for the first time. He must feel the temptation to put the most favourable view upon his client's case. The matter is an exceedingly difficult one. I believe in most cases an action begins by affidavits, and I would suggest that where it is supposed scientific witnesses may be required, one side or the other, or both, might demand that scientific evidence should be called in when these affidavits are prepared. The judge might then be empowered to decide on the *prima facie* evidence whether these witnesses should be called, and if they were, it would be at the instance of the court itself and not of the plaintiff or defendant, just as in certain divorce cases it is customary to order the Queen's Proctor (an independent barrister employed by the court) to intervene. If some such suggestion were elaborated, it might be necessary to have three chemists, one appointed by each side and one by the court; these three independent chemists might meet and present a joint report. If some plan of this kind could be adopted I cannot but think that the interests of justice would be furthered and the interests of the chemical profession also. There is a vast number of cases in the

subject of which the chemist engaged has had very little experience, and there may be some about which he knows nothing at all. He is thus placed in a very serious position if he is called in to advise in such cases, for of course he does not like to lose employment by refusing to appear. A more truthful result is therefore likely to be obtained when scientific witnesses are called in like umpires or arbitrators to decide between two litigants, than if the former are placed like ordinary witnesses in the witness-box.

DR. DUPRÉ: When I first came over to England, I was rather horrified at the position of scientific men when called to give evidence; but since then I have altered my opinion, and I now believe it would be very difficult to devise a system better calculated to bring out truth than the one at present employed. We must suppose that a scientific man is an honest man, and this should never be lost sight of, for no system would work with dishonest scientific witnesses. The object of the proceeding in a Law Court is to find out the truth, and if a man is engaged on one side, he knows well enough that men are engaged on the other side quite as good as himself, and any mistake he makes is sure to be found out. When a man has to go into the witness box, he has a much greater inducement to go thoroughly into the matter, so as to be able to answer any question put to him, and by this opposition of intellects, the truth has a much better chance of coming out than by three or four men getting a commission to draw up a report. Of course a chemist must go into the witness box with a perfect conviction of the truth of the statements he is about to make. If he fences or shirks the question, or is prepared to tell an untruth, the man is unfit for any profession. I have not had so bad an experience of scientific witnesses as some seem to have had, and it seems to me, that the chemist will come out of any ordeal quite as satisfactory as the member of any other profession. With regard to the assertion, that a man may be engaged in a case, and yet know nothing of the subject, I would advise such a man to have nothing to do with the case; but to tell his client,—I am very sorry I cannot advise you; but I can tell

you who will do it for you,—go to so and so. A man whose sole view is not simply to make money would certainly act thus. As I said before, I think the present system is, on the whole, a good one, and it is not so easy as some imagine to devise a better.

DR. STEVENSON : I endorse Dr. Dupré's statement as to the advantages of the present system. On evidence given in a Court of Law, the judge, counsel, and jury may even put questions which may throw a new light on the subject, and a person in the position of a judge, looking at the evidence on both sides and forming an unbiassed opinion of the question, is in a far better position than any number of scientific witnesses in a private chamber. I think the system of having *viva voce* evidence and cross-examination is a very great advantage indeed. With regard to the position towards the legal profession, we have heard it stated this evening that the desire of the barrister is to puzzle the witness. As far as my experience goes this is rather a strong expression. More often the desire of the barrister is to elicit one side of the case and to obtain correct information. When a barrister endeavours to puzzle a witness he certainly does his case damage.

A letter from PROFESSOR ATTFIELD was read by the SECRETARY as follows :—

“The code of chemical ethics in this country is yet unwritten ; but I believe that what amounts to a code already exists. Indeed, when did a number of educated English professional men, having interests in common, ever work more or less together without principles of honour guiding their conduct towards each other, towards their clients, and towards the members of the community generally ? Differ from each other scientific chemists certainly do, and must, so long as the working of any chemical law is obscure, and so long as there remains a chemical law unveiled to their vision. Nay, analytical and consulting chemists are but men, and *humanum est errare*. But that they, more than most men, stand in need of canons of conduct, may safely be denied. If ‘it is a common remark that scientific men can be got to swear to anything,’ let it remain common, in company with all else that

is common. What men cannot understand they too frequently affect to despise, or go to the other extreme and worship. Professional chemists as a class can afford to live down such common charges, knowing them to have, as regards the class, no foundation. While however chemists, in justice to themselves, cannot, I think, plead guilty to any larger proportion of ethical lapses than obtains in other professional bodies, the fuller publication amongst themselves of rules or practices of professional etiquette may perhaps be desirable. Hence the discussion of the subject may do much good, and could scarcely be more appropriately entertained than by the Institute of Chemistry. As regards the points raised, I do not see why any man, scientific or non-scientific, should be debarred from advocacy; always provided that he confessedly pleads as, and is recognised by all as occupying the position of, an advocate. In the world of men generally, it may be quite honourable to belong to this party or to that. The sin is in fighting under false colours. The man of research may adopt one line of conduct, the amateur another; but the chemist who has to live by his calling must honourably do what the public honourably demands. I cannot think that there is any 'distinct demand' worth naming 'for dishonest scientific evidence.' That the chemical advisers of opposing litigants should assemble with the object of deciding possible differences is, I think, impracticable. That a client should know 'the exact truth' may be desirable. But who is to teach it? Who knows it himself? Chemistry is doubtless an exact science. And, doubtless, nature is largely governed by laws we term chemical, of which we know a few. But chemistry is one thing, what we know of chemistry is another. A client must perforce be content to get as near to the the exact truth as the current state of knowledge permits. Respecting the final question, I agree with Dr. Angus Smith, but think that law and justice would sometimes reap advantage were judges aided by scientific assessors."

MR. THOMSON, in reply, said: There are one or two points in the discussion which I propose to answer. The first is in reference to the words in my paper "Should a chemist act as a judge in

respect of any question brought before him for investigation." This sentence has been misunderstood by some of the gentlemen who have taken part in the discussion. It was not whether the chemist should act as a judge to decide between the opposing litigants, that would be absurd; what I meant to imply was, should the chemist investigate the matter placed in his hands with a view to arrive at the truth, the whole truth, and nothing but the truth, and report to his client accordingly; or should he, as it has been expressed in the discussion, "do the best he can for his client?" The latter position seems to me quite untenable, and if chemists investigate with that end in view, they must become to a greater or less extent advocates, and there will, under those circumstances, be little chance of their rising in the esteem of the public.

A similar expression has been used by another gentleman, but in this case it was couched in the words "every man likes to win the case in which he is engaged;" that expression was doubtless used thoughtlessly, the emulation among chemists should be, not simply to win their clients' cases, but to arrive at the exact truth with reference to any questions placed before them, and if investigations are carried on in this spirit chemists will act best towards the real interests of themselves and their clients.

One remark was made to the effect that it was discreditable for one chemist to prompt counsel in the cross-examination of another engaged by the opposition. Under the present state of affairs I hold, that although prompting is exceedingly unpleasant for the prompter, it cannot be considered in any degree discreditable. It not unfrequently happens that chemists endeavour to gain their clients' cases without carefully considering whether they are right or wrong, and if the scientific men opposed to each other, having carefully investigated the case, arrive at an unbiassed conclusion that their evidence is right, but that the counsel engaged is not able to comprehend the exact points of the case, then it is the bounden duty of the chemist to his client and to justice to prompt the counsel. If, however, the scientific men on the opposing sides could meet together previous to the hearing

of the case and draw up a joint report, or compare notes and discuss the questions at issue, the result would clearly be in favour of the ends of justice being attained, and it would simultaneously increase the reputation and usefulness of every member of our profession.

THE PRESIDENT: I think we have had a good illustration this evening of the usefulness of the discussions instituted by this Society. We have exchanged views upon a very important subject, and a consideration of the views expressed, appears to justify the conclusion, that there is no very great difference between the opinions of the speakers. There may be some among us who entertain somewhat different views regarding the functions which a chemist may exercise in addition to those of a witness, and whether some reforms are not desirable in reference to such functions. There is no doubt that when a chemist is engaged in cases which come before Courts of Law or arbitration, he has two distinct offices. He has to perform the important duties of adviser or counsel up to the point of his appearance as a witness, when his functions change altogether. It is in the first instance his duty to advise his clients and labour for their interests as far as it is possible, as, for example, in the care to search out and grapple with every weak point in the case of his employer and of the opponent; but when he goes into the witness-box his duty is simply to deal honestly with matters of fact and to put forward cautiously and moderately those points in his evidence which are matters of opinion and not to flinch from speaking the whole truth. I am perfectly sure that as long as we chemists faithfully act up to these broad principles, whether change be introduced into the method of dealing with chemical evidence or not, we may be perfectly certain we shall do our duty by them who entrust their interests to us. I congratulate you upon the useful nature of the discussion which has taken place, and believe it probable that on some future occasion we may resume it with advantage.

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.



REPORT
OF
A CONFERENCE
ON
STANDARDS OF STRENGTH AND PURITY,
AND EVIDENCES OF ADULTERATION OF
DRUGS;
ALSO
THE REPORT OF THE COUNCIL
AND
BALANCE SHEET FOR 1880,
TOGETHER WITH
THE PRESIDENT'S ADDRESS.



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INSTITUTE OF CHEMISTRY.

CONFERENCE

ON

STANDARDS OF STRENGTH AND PURITY, AND
EVIDENCES OF ADULTERATION OF DRUGS,

Held Wednesday, December 8th, 1880.

PROFESSOR REDWOOD: The Sale of Food and Drugs Act has opened a wide field for occupation to chemists who are engaged not only in the duties of Public Analysts, but also in those of checking what may be thought to be the too eager assaults of official prosecutors acting under the authority of this Act.

The maintenance of a high and uniform standard of quality in drugs, including under this term all medicines, is of the utmost importance, not only for ensuring their safe and successful use, but for promoting the much-needed advancement of knowledge in therapeutics.

It has been well remarked that all the knowledge, skill, and judgment of the most learned physician, when applied in the treatment of disease, is centred in "that scrap of paper, the prescription," and it might be added that the efficacy of the prescription implies a knowledge of therapeutics, and involves the

use of drugs of uniform and known qualities. It is obvious, therefore, that all available means should be adopted not only for preventing the adulteration of drugs, but for promoting the use of such as are good in quality, and in which the greatest practicable uniformity of strength and composition is maintained. The attainment of these important objects, however, is not so easily effected as might be supposed. Most of our crude drugs come from abroad, many of them from places with which we have little or no direct communication, and where they are collected from plants in their wild state by uneducated natives; others are produced by processes which do not yield uniform results; and the names of some are very indefinite in their signification.

Using the term drug, as I have already done, in the sense in which it is employed in the Sale of Food and Drugs Act, it may be said that the collection, preservation, production, and preparation of drugs are comprised in and constitute the art of pharmacy, the practice of which in connection with that of medicine has existed at all periods to which history extends. But a rational pharmacy has existed only in modern times.

In this country the first evidence of the official application of scientific knowledge to the selection and identification of drugs is found in the London Pharmacopœia of 1721, which was compiled under the supervision of Sir Hans Sloane, then President of the London College of Physicians. In the preface to that work, it is stated that "The catalogue of simples has been drawn up entirely *de novo*; the name of each plant,—and in some cases there are more than one,—has been annexed, both the officinal name and that which is retained by the more accurate botanists. Those who know how easily plants of the same genus and name may be confounded, must clearly see that errors could scarcely have been avoided in any other way than by employing this distinction of terms." But notwithstanding the improvements made at that time, and from time to time subsequently, it cannot yet be said that we have a complete knowledge of the botanical origin of all our drugs, or that we have the means of ensuring uniformity of quality in many of them.

At a later date, in 1746, a further and much greater improvement in British pharmacy was effected by the London College of Physicians, who, referring to the medicines then and previously used, say, "It were certainly a disgrace and just reproach if pharmacy should any longer abound with those inartificial and irregular mixtures which the ignorance of the first ages introduced, and the perpetual fear and jealousies of poisons enforced; against which the ancients endlessly busied themselves in the search of antidotes which for the most part they superstitiously and doatingly derived from oracles, dreams, and astrological fancies, and vainly hoping to frame compositions that might singly prevail against every species of poison, they amassed together whatever they had imagined to be endowed with alexipharmic powers. By this procedure, the simplicity of physic was lost, and a wantonness in mixing, enlarging, and accumulating took place." The result of the reformation at this time effected was that many old prolix formulæ were rejected, and much more simple formulæ adopted, which have formed the basis of most of the so-called galenical medicines employed in this country from that time to the present. This may be said to have been the commencement of the introduction of a rational pharmacy among us.

Again, in 1788, a further change was made, and as that which had been effected in 1746 related to what are called galenical preparations, so this affected chiefly the chemical compounds used in medicine. Chemical and botanical names now came to be used in pharmacy consistently with the knowledge and views of scientific men, and as these underwent change the names of medicines did so also, a result which has sometimes been attended with inconvenience, if not danger. Thus, for instance, the name chloride of mercury has sometimes represented calomel and at others corrosive sublimate.

Frequent changes in the names of drugs are, simply as such, objectionable, and although the scientific names they have received and are known by may, as they necessarily must, sometimes become antiquated, it is not always practicable, without obvious inconvenience and evil, to use names of modern science, such, for instance, as ferrous and ferric sulphate.

Up to the end of the first quarter of the present century, all or nearly all the improvements which took place in pharmacy—that is in the production and definition of drugs—were effected by medical men who were at the same time engaged in the practice of their profession, and could not therefore be supposed to have much time to devote to pharmaceutical investigations. But during the last forty or fifty years pharmacy, which for about half a century previously had been struggling to obtain an independent existence of its own, has succeeded in vindicating its claim to recognition as a distinct occupation or pursuit, the qualifications for which have been made subjects for special study under the provisions of an Act of Parliament.

There is not the same excuse now that might have been urged a century or even half a century ago, for the sale of bad, impure, or adulterated drugs. Much has been done, especially since the establishment of, and by those connected with, the Pharmaceutical Society, towards the improvement of the supply of crude drugs, by tracing out their natural sources in foreign countries, drawing attention to imperfections in the methods of collecting and preserving them, and generally extending the knowledge of their distinctive characters, and the properties on which their medicinal efficacy depends. Much has also been done, with reference to manufactured drugs, towards increasing their purity and uniformity of composition, or the identity of their properties with those required in accordance with authorised formulæ.

Practices which existed, and were not uncommon a century or less ago, by which drugs were largely adulterated, are now unknown or resorted to only in rare instances and in a very mitigated form. Allusion is still sometimes made in books to such practices, but it is necessary to receive the statements so made with caution, for they are often copied from one book to another without reference to time or place. Founded on this kind of book-knowledge, very erroneous opinions are occasionally expressed respecting supposed existing adulterations.

With regard to the drugs consumed in this country, and supplied in the usual way by our registered chemists and druggists,

I am not aware, and do not believe that anything like systematic or serious adulteration exists. Instances, undoubtedly, do now and then come to light of isolated cases of drug adulteration, but notwithstanding the periodical investigations of inspectors and analysts appointed under the Sale of Food and Drugs Act, and the vigilance of a numerous body of well-informed and scientific pharmacists in various parts of the country, who are fully competent for the detection of such cases, and always ready and anxious to discover and expose them, the number thus detected is very small.

If, however, we take a more comprehensive view, so as to include all dealings in drugs by unqualified as well as qualified dealers, it will be found that the result of official investigation has been less satisfactory.

The Local Government Board, in their recently issued Report for 1879-80, say—"We regret to find that drugs continue to be largely adulterated, no less than 171 samples being reported against out of 613 submitted to analysis." This view of the case, however, requires to be qualified by the statement, made elsewhere in the report, that the numbers given represent all cases described as adulterated by analysts in their quarterly reports, although in some of the cases the defects were so slight that no proceedings were taken, whilst in others, although proceedings were taken, they were not followed by convictions.

The report, in commenting on the cases of adulteration, alludes to some of the prominent ones, and especially to the sale of "paregoric," a popular remedy for coughs, which ought to contain opium, but in which no opium could be detected, to sweet spirits of nitre, which was found to be mixed with 40 per cent. of water, and to tincture of rhubarb reduced to half its proper strength. These cases represent practices that cannot be too strongly reprobated, but it is to be regretted that the report fails to explain, what I believe to be the fact, that such grossly adulterated articles were sold only by unqualified persons, usually grocers or small huxters, who, in country places, often sell some of the drugs used in domestic medicine. Paregoric, being an article of this class,

has usually been sold by such persons, but as preparations of opium can now only be legally sold by registered chemists and druggists, a special preparation under the same name, but without the opium, has been provided for the purpose of enabling unqualified dealers to evade the law. The Local Government Board might have contributed to the discouragement of this kind of adulteration if they had cautioned the public against purchasing drugs, and especially powerful drugs, from dealers who have no adequate knowledge of the properties and distinctive characters of such articles. A reference to the Pharmaceutical Journal would show that the delinquents in such cases as those under notice, have not been legally qualified druggists. And cases such as these constitute a large portion of those officially reported upon.

But there is another class of cases, illustrative instances of which may be found among those alluded to by the Local Government Board. They speak of cream of tartar, which has been found "largely mixed with sulphate of lime." I presume what is meant here is that since the practice of "plastering" wines has been more extensively indulged in than formerly, cream of tartar has sometimes contained an unusual proportion of calcium tartrate. This ingredient, however, has always been found in cream of tartar in variable proportions, and its presence, unless in excessive quantity, has been looked upon as a necessary impurity, and not as an adulteration. The more special impurity, which has only been noticed latterly, and the presence of which has never been satisfactorily accounted for, namely barium sulphate, is not alluded to in the report. We are told, however, that tartaric acid has been met with "containing lead in quantity sufficient to injure health," and that some samples of sweet spirits of nitre have been entirely destitute of nitrous ether. Only one other article is alluded to in the report, namely fluid magnesia, which it is said has been found to contain "only 3·3 grains of magnesia per fluid ounce, instead of the five grains which is the proper quantity."

Now, taking these cases as fairly representing,—and I believe they do fairly represent,—the sort of adulteration which may be

charged to the account of legitimate dealers in drugs, what are we to say with reference to them? We have certain standards of strength and purity by which to estimate the quality of drugs. Are we rigidly to apply such standards as we have, and to condemn all articles which fail to accord therewith?

Our only officially authorised standards are those of the Pharmacopœia. Before the publication of the British Pharmacopœia only slight attempts had been made to define authoritatively the strength and purity of drugs by other than physical characters. In the Pharmacopœia of 1864 (the first British Pharmacopœia) the use of chemical tests was pretty freely introduced, but it was urged by practical men that some of the standards then adopted were unduly severe, and that others were insufficient. In the subsequent edition of the work, issued in 1867, which is still in authority, new tests were introduced, and the standards, although in a few instances lowered, were made generally more complete.

It is obvious that chemical purity in commercial articles such as drugs, is either unattainable or could be only attained at a cost disproportionate to any practical advantage that would result from it. Nevertheless it is desirable, in accordance with the views already expressed, that all reasonable means should be adopted for ensuring a supply, and the use of drugs, the composition, strength, and purity of which are maintained as uniform as possible. With the view of promoting this object, the 15th section of the Pharmacy Act, 1868, imposes a penalty of five pounds on any person who "shall compound any medicines of the British Pharmacopœia except according to the formularies of the Pharmacopœia." The authority of the Pharmacopœia is therefore generally referred to when questions relating to the adulteration of drugs arise.

It is important, however, to observe that the introduction of standards of strength and purity into the Pharmacopœia took place before the passing of the Sale of Food and Drugs Act; and that such standards when introduced were not intended to be applied in the enforcement of penal restrictions with reference to the

general sale of drugs. The Pharmacopœia standards are in some cases not only higher than drugs of good average quality reach, but even higher than those of the best quality attain to as met with in commerce. In some instances they may be looked upon as standards of excellence to which it is desirable to reach, if possible, but which may be a little above what is at present practically attainable.

It should also be observed that the law, which imposes a penalty for deviations from the instructions of the Pharmacopœia, relates to the compounding of the medicines of the British Pharmacopœia, and this law can only be put into force by the Registrar of the Pharmaceutical Society. It is further worthy of note, that although this law was embodied in the Adulteration Act of 1872, it is not comprised in the Sale of Food and Drugs Act of 1875.

It would appear, therefore, that we must seek in sections 4 to 8 of the Sale of Food and Drugs Act, and in the knowledge possessed by those acquainted with the practice of pharmacy in its various departments, as well as in the Pharmacopœia, for the standards of strength and purity and the evidences of adulteration, from which to form a just conclusion when questions of drug adulteration arise. The information derived from these several sources may not always coincide, and it will sometimes be necessary to qualify the statement of one authority by that of another.

Thus with reference to cream of tartar, are we to judge every commercial sample by the pharmacopœia standard, which says: "Heated in a crucible it evolves inflammable gas and the odour of burned sugar, and leaves a black residue. This effervesces with diluted hydrochloric acid, and forms a solution which, when filtered, gives a yellow precipitate with perchloride of platinum, and when neutralised by ammonia is rendered slightly turbid by oxalic acid." If every sample of cream of tartar which failed to accord with this test were to be condemned as adulterated, we should have very little left for use. It would, therefore, I think, be right to appeal in such case to the experience of those who are acquainted with the production and commerce of cream of tartar, and founded on the knowledge so obtained, to take

advantage of the provision of the Sale of Food and Drugs Act, which specifies that the offence which might otherwise be imputed shall not be deemed to be committed, "where the drug is unavoidably mixed with some extraneous matter in the process of collection or preparation." There is no cream of tartar to be got that is free from calcium tartrate, and although samples may sometimes be met with that contain only two or three per cent. of tartrate of calcium, in most cases the proportion is much greater than that, and it commonly reaches five or six, or even eight per cent.

With reference to the presence of lead in tartaric acid, there cannot be two opinions as to the importance of preventing so objectionable a contamination, and generally, I believe, due care is taken by chemical manufacturers to accomplish that object. Traces of this or other metal may sometimes, no doubt, be detected in such articles as tartaric acid, but I should be very much surprised to find a quantity sufficient to injure health ; and with regard to the case alluded to in the report, it would have been desirable to know what quantity of lead was proved to exist in the acid. I recollect being engaged, many years ago, with Professors Graham, Miller, and Alfred Taylor in an investigation of the conditions under which water might become impregnated with lead, and we found that the water of the London water supply, if left in contact with clean lead, would take up enough of the metal to admit of its detection by delicate chemical tests ; but it was thought very undesirable to create an alarm by publicly referring to the fact. Metallic vessels are necessarily used in many manufacturing operations, tin and copper being preferred where applicable, but lead is often used for lining crystallising tanks, and articles prepared in such vessels frequently contain traces of the metal of which the vessel is composed. It is quite right that public analysts should keep a watchful eye for the detection of such quantities of metallic impregnation as are avoidable or might prove injurious, but any attempt to create a popular prejudice where no real evil exists, is to be deprecated.

The report of the Local Government Board alludes to "sweet

spirits of nitre entirely destitute of nitrous ether," but I am not aware that such an article has been met with except when largely diluted with water, and sold by persons, usually small huxters, unconnected with legitimate pharmacy. It must be admitted, however, that the subject of sweet spirits of nitre is a troublesome and unsatisfactory one. The article is one for which there is a very large sale, and the consumption of it is principally as a popular domestic medicine. There have been several processes given for its preparation, some of which yield a product containing scarcely any nitrous ether, and unfortunately this is the kind of article most approved of by the public. The name "sweet spirits of nitre" is not recognised in the British Pharmacopœia, and, therefore, the "spirit of nitrous ether" described in that work does not necessarily represent it, although the latter preparation is generally sold for it in the better class of pharmaceutical establishments. But much of what is sold as sweet spirits of nitre is made by a process taken from one of the old pharmacopœias, and this is largely supplied for unprofessional use, being preferred by the public who will go where they can get it. For many years I have taken a great deal of pains in endeavouring to supersede the old-fashioned sweet spirits of nitre of variable composition and with sometimes but a trace of nitrous ether in it, by the introduction of a process, now given in the British Pharmacopœia, which yields a product uniform in composition when first prepared, and containing five or six per cent. of nitrous ether or other nitro-compound. If this had been a weaker preparation than it is, it would have been more palatable, and I have no doubt my attempt would have been more successful, for in its existing state the public object to it, and, therefore, the old-fashioned sweet spirits of nitre is still sold. Nor does the difficulty attending this preparation end here. The article made according to the pharmacopœia, although it may strictly answer to the pharmacopœia standard when first prepared, will soon cease to do so, because the ethereal liquid, partly consisting of aldehyde, undergoes decomposition when exposed to the air. Even the "spirit of nitrous ether" of the pharmacopœia, therefore, which

ought to be always used in dispensing, and I believe is so used, is not a preparation of constant composition, and some allowance has to be made for slight deviations in it from the Pharmacopœia standard.

I do not think that any serious case has been made out against the legitimate and qualified dealers in drugs with reference to the sale of sweet spirits of nitre. The most that can be said is, that among a class of the public who are accustomed to doctor themselves and their families, by the use of familiar remedies which "have hereditary reputations," there is a demand for an article called sweet spirits of nitre, and that some druggists, whose businesses consist in selling drugs rather than in dispensing prescriptions, supply the sort of sweet spirits of nitre which the public requires and most approve of. I do not say that this indicates a satisfactory state of pharmacy, but neither do I say that the case is one in which the pharmacopœia standard for "spirit of nitrous ether" should be applied to an article sold under a different name which originally represented, and still represents, the article sold.

The circumstances affecting sweet spirits of nitre are similar to those which applied to paregoric in the early part of this century. Paregoric Elixir is a very old remedy for coughs, which was popularly used as such long before it was introduced, in 1746, into the Pharmacopœia. Its pharmacopœial name was then "Elixir Paregoricum." This name was changed in the Pharmacopœia of 1788, to "Tinctura opii Camphorata." It was made with camphor, opium, benzoic acid, oil of aniseed and spirit. Its familiar name was still "paregoric," and the pharmacopœia formula under the name of "Tinctura opii Camphorata" represented it. In the Pharmacopœia of 1809, the name was changed to "Tinctura Camphoræ Composita," and at the same time the oil of aniseed was omitted from the pharmacopœia formula, all the other ingredients being retained. Now, what was the consequence of this change? Why, that the public refused to receive the new tincture for paregoric, because it lacked the most pronounced character of their old familiar remedy which the oil of aniseed gave it, and druggists, even those of the highest standing, were

obliged to keep the old preparation with oil of aniseed as well as the new—one for the general public and the other for medical prescriptions. This state of things continued until 1836, when a new Pharmacopœia was brought out, and the oil of aniseed was then restored to the official preparation. I believe this was done for the mere purpose of satisfying the public taste for paregoric with oil of aniseed, and to obviate the necessity for keeping two preparations. I perfectly recollect the influence which was brought to bear in getting the compound tincture of camphor of the pharmacopœia reconciled in character with paregoric elixir, and I believe that something of a similar description will have to be done with reference to sweet spirits of nitre.

The only remaining article alluded to by the Local Government Board is "fluid magnesia," which they say has been found to contain "only 3·3 grains of magnesia per fluid ounce instead of 5 grains which is the proper proportion." Now, fluid magnesia, like sweet spirits of nitre, is much more largely used unprofessionally than otherwise, and when so employed a solution containing about 3·3 grains of magnesia per fluid ounce is preferred to the stronger preparation of the pharmacopœia, and is commonly used and better suited for such use. I was responsible for the introduction of the 5 grain solution into the pharmacopœia, but some time after the publication of the work, I became satisfied that the fluid magnesia ordered there was too strong. In some notes on the Pharmacopœia, which were published in the "Pharmaceutical Journal" in 1870, I remarked, with reference to "Liquor Magnesiae Carbonatis," "this preparation would, I think, be improved by reducing its strength. The process as given in the Pharmacopœia, yields a solution containing 13 grains of carbonate of magnesia to the fluid ounce, but it can only be kept of this strength while it is fully charged with carbonic acid gas. On exposure to the air, some of the gas escapes, and carbonate of magnesia is then deposited. A solution containing 10 grains of carbonate of magnesia in the ounce would be more easily made and much more easily kept for use without alteration of strength." The Paper from which this is an extract, was read at a meeting of

the Pharmaceutical Society, with a view of eliciting discussion among practical pharmacists respecting suggested improvements in some of the pharmacopœia processes when a new edition should be called for. It was then expected that a new edition would be brought out in a few years; but, although some 40,000 copies of the work have been sold, comprising several reprints, the Medical Council have been, and still are, slow in seeking a new edition, and in the absence of such, manufacturers are adopting some of the suggested improvements unofficially. I see no other objection to the sale of fluid magnesia with 3·3 grains of magnesia per ounce than that its use as a domestic medicine might lead to its being sometimes employed in place of the stronger preparation in dispensing prescriptions. For the ordinary purposes for which fluid magnesia is required I consider it sufficiently strong, and better adapted than the stronger preparation.

I have now disposed of the cases specified in the Report of the Local Government Board, and if the imputation conveyed in the statements made there rested only on such of the cases as apply to qualified or legitimate dealers in drugs, it would not, in my opinion, amount to much; but I have no doubt there are included in the 171 cases of imputed adulteration, a certain number of such as are not specified, but of which we have occasionally heard under the names of "violet powder" and "milk of sulphur." At one time there was quite a raid on druggists and general dealers for articles sold under those names, which, if they were found to contain sulphate of calcium, were represented to be adulterated. In many of these cases no defence was attempted, and dealers were frightened into a tacit submission to imposed penalties, although no real offence had been committed, but since it has been shewn, on adequate authority, that the imputation in those cases arose from prejudice or imperfect knowledge, the number of prosecutions has dwindled down to next to none. I still, therefore, maintain the position with which I started, that as far as relates to the class of registered chemists and druggists, including, of course, the higher grade of pharmaceutical chemists, there is no evidence of any systematic or serious adulteration of the drugs

sold by them ; and although there may be, as no doubt there are some slight deviations occasionally from the required observance of authorised instructions, which it is very desirable to remedy, I feel assured the Members of the Institute of Chemistry will concur in the opinion, that the best and fittest mode of providing a remedy for such irregularities, and at the same time of raising the standards representing the qualities of drugs, is by increasing and extending the practical and scientific qualifications of those who are engaged in this department of commerce.

DR. DUPRE : Before I begin my remarks I should wish to ask Dr. Redwood one question, namely, does he still hold the opinion expressed by him in a letter to the "Pharmaceutical Journal," in October, 1879, which was to the effect that the test for purity given in the British Pharmacopœia, under the head of Characters and Tests, refers to minimum and not to maximum quantities of impurity permitted to be present. Public analysts have certainly always supposed that the plain meaning of the terms used was that they related to maximum and not to minimum quantities.

In the first paragraph of his Paper, Professor Redwood states that the "Sale of Food and Drugs' Act" had, among other things, found employment for those chemists "checking what may be thought the too eager assaults of official prosecutors acting under the authority of the Act." If by official prosecutors he means the sanitary inspector or the police, we here have nothing to do with those ; if he means public analysts, he labours under a mistake. Public analysts are not public prosecutors, and this fact should be fully recognised : the sole function of the public analyst is to analyse articles of food and drugs brought to him, and to report the results to the persons who brought them. It must, however, be remembered that the Act says nothing about adulteration. All it says is that the article bought should be "of the nature, substance, and quality demanded," and this distinction is of great importance. It is often possible to prove that an article is not of the nature demanded, although it may be impossible to prove that it is adulterated. Now, with regard to so-called qualified chemists, it must be remembered that they sell their

drugs at considerably higher prices than ordinary druggists, and fairly so if their drugs are pure. They claim to do so on account of the expensive education they had to pass through before they could call themselves pharmaceutical chemists, and that, therefore, they are not to be put on a level with ordinary druggists. They must, therefore, be judged as, in some degree, educated men, and the public have a right to expect that if they go to a qualified chemist every article they get is of the nature, substance, and quality demanded. Drugs may vary owing to many different circumstances. As for example—an important constituent of the drug or medicine may be left out or be put in in less than the proper proportion; or a neutral substance may be added for the purpose of dilution, or the proper active ingredient may be replaced by a cheap and inferior substitute, &c. Then variation may be brought about by direct, wilful adulteration, by careless manufacture, by purposely selecting inferior and therefore cheaper qualities of drugs, by any of which the main object of the adulterator—an increased profit—may be attained.

It becomes therefore of the highest importance to the public that there should be some standard by which to judge of the quality of a drug, and my contention is, and has always been, that if a drug is sold by a pharmaceutical chemist under a name recognised in the British Pharmacopœia, and of course still more so if it is sold as representing a British Pharmacopœia preparation, then it should be in accordance with the standard of the Pharmacopœia. If it differs in any material degree from such standard, the chemist has committed a fraud, and no amount of sophistry will alter this fact. It is no defence to say that some drugs deteriorate with time. The chemist ought to know this. His education is given him for this purpose. What should we think of a public analyst, who having made a mistake, in consequence of which a chemist has been placed on his defence, should say, "I am not to blame, my standard solution had deteriorated, or my balance had got out of order, and these things have an unfortunate habit of going wrong?"—why, he would be dismissed as unfit for his

calling. It is no defence to say that a drug has been collected by ignorant natives, or to say that the impurity present is, although great, only a natural one. What should we think of a consulting chemist who, in a charge of fraud against a silversmith for having sold spoons of lead in place of silver, were to give evidence that silver was often associated with lead, that indeed much silver was extracted from lead, and that therefore the silversmith was not to blame for having sold spoons which simply contained a natural impurity. Fortunately, in matters directly affecting the pocket, our judges, magistrates, and the public generally, are sufficiently educated, and such a defence would naturally be scouted. But in regard to drugs, general education is, unfortunately, very deficient, and a similar defence sometimes succeeds. Then, as to careless manufacture. Consider that the object of adulteration is improper gain, by reducing the price to the seller, at the expense of quality, and this end may be gained by careless manufacture. When a chemist is charged with selling soda-water containing less than 1 grain instead of 30 grains of bicarbonate of soda per pint, is it any defence to state "that a little less than the ordinary amount might have been taken in this individual bottle, that some of the soda actually taken had been dropped, by the boy employed, outside the bottle, and finally that some of the soda actually introduced into the bottle may have been projected out again on the introduction of the effervescent water!" As well might a goldsmith charged with selling 1 carat gold for 18 carat gold, say that some of the gold had dropped outside the crucible.

My experience of drugs is very different from that of Professor Redwood. If you deal with ordinary pharmaceutical chemists, and ask for sulphate of quinine, iodide of potassium, bromide of potassium, or indeed any drug consisting of a single well-defined chemical compound, the article supplied is generally pretty good in whatever part of London it may be bought. But the case is entirely different the instant you pass to drugs that are more or less an altered natural product, or that should contain a given percentage of the active ingredient. In such cases, it will be found that at least one out of every two articles bought differs

widely in nature, substance, and quality from that demanded. If we find much starch and chalk, we are told that the starch is added to prevent pieces of the drug from sticking to each other, and that the chalk has been blown into the drug from the soil during the process of collection. What is the pharmaceutical chemist educated for, if not for the purpose of recognising these impurities, so that he may either get rid of them or reject the drug, and not sell it as of the nature, substance, and quality of the drug demanded, in which these impurities should be present in very small proportions only, if at all? It will be found that citrate of quinine and iron, B.P., is supplied containing only 4 instead of 16 per cent. of quinine, and with tartaric in place of citric acid, and whereas, as previously stated, the sulphate of quinine sold is generally pure, the alkaloid present in this preparation often contains much cinchonine. *Acid hydrocyanic*, B.P., is sold with only $\frac{1}{2}$ per cent. instead of 2 per cent. hydrocyanic acid; *liquor arsenicalis* with only 2 instead of 4 grains arsenious acid per ounce, and so on. It may be that some of the standards given in the Pharmacopœia are too high; if it be so, by all means let them be lowered, but as long as these standards are the only legally recognised standards, chemists should be made to adhere to them.

As to cream of tartar containing calcium tartrate, and the attempted explanation of the fact, I entirely differ from Professor Redwood. In the first place there is no evidence that the plastering of wines has increased materially except perhaps in some parts of the South of France. Plastering is an immemorial custom. In the second place, the plastering is almost invariably done to the grapes, and the calcium remains with the husks in the form of calcium tartrate. A plastered wine contains little or no tartaric acid, and therefore can deposit no tartar. Cream of tartar should be the purest form of tartar sold, and so far from its being, practically, impossible to free it from lime, the Prussian Pharmacopœia makes such removal compulsory.

It has been pointed out this evening by Professor Redwood, and is indeed well known, that the Registrar of the Pharmaceutical Society

can set the law in motion against any person compounding, and I presume selling, medicines of the British Pharmacopœia except "according to the formulas of the pharmacopœia." May I ask Professor Redwood how often during the last twenty years this law has been set in motion against a Pharmaceutical Chemist? I have often read of unqualified persons being prosecuted at the instance of the Pharmaceutical Society, and fined £5, for selling poisons, but I have never seen one case in which a member of the Society has been prosecuted under the above Act. It cannot be urged that the fact of adulteration being practised was unknown to the Council of the Pharmaceutical Society, for there is abundant evidence to the contrary.

We have many Members amongst us who are also Members of the Pharmaceutical Society, and if these can induce the Pharmaceutical Society in future to go hand in hand with public analysts, as far as possible, instead of more or less opposing them, this Conference will not have been held in vain.

MR. UMNEY: I quite agree with our President, that the subject brought before us this evening is a most important one. As far as I know, no person is so competent to speak authoritatively on this subject as Professor Redwood, for he has made it his special study, and upon it can bring to bear the experience of at least half a century.

Those who are acquainted with the collection, importation, and sale of drugs, whether in a crude form or when manufactured into galenicals, know quite well that systematic adulteration is as rare now as it was common in the early part of this century, and that this happy change has in the main been brought about by the better education of those whose business it is to traffic in drugs, forced on, perhaps, latterly by the wholesome regulations of the Sale of Food and Drugs Act.

I remember discussing "pure drugs" nearly twenty years since with a pioneer in this path for purity of all medicines, whose age was, at the time of our conversation, over fourscore years, and he assured me that at the end of the last or in the early years of this century, it was a common practice to sophisticate powdered drugs,

one example of which may be given, viz: the sending of white bryony and jalap roots together to the public drug mill to produce powdered jalap. Such tricks as these in the present day are not even thought about, much less practised.

Dr. Dupré, as far as I can judge, has just been pleading as would an able advocate for his client to make good the statement of the Local Government Board, and making charges which cannot, in my judgment, be supported by facts.

Dr. Dupré referred to a drug which he said sometimes contained starch and chalk. He did not mention it by name, but I presume he meant scammony. Now, how is scammony collected? Is it not collected by the natives of Asia Minor by attaching a shell to a portion of a scammony root and there leaving it until it shall be filled with resinous exudation? Under such circumstances, should we condemn a specimen that contained traces of earthy matter? and considering the glutinous state in which this gummy, resinous mass has to be handled, should we always expect to find starch absent? I can testify that I have seen scammony which although it would analyze upwards of 80 per cent. of resin, and thus conform to the Pharmacopœia requirements, yet would not stand its test for the absence of starch.

Now, citrate of iron and quinine has also been alluded to, and statements made which are at variance with my own experience, and more especially as to commercial specimens containing but 4 per cent. of quinine. I think I might here publicly defy and challenge any one to procure from any six pharmacies in the immediate vicinity of Burlington House, or even in London, a salt sold as the officinal one and containing so small a proportion of quinine as that just indicated.

Soda water has also been mentioned, and the plea put forward by individuals who, when summoned under the Act, said *the boy* had failed in his duty to put in the requisite quantity of alkali into each bottle. No one practically acquainted with the details of an aerated water factory working with Bramah's continuous process, would be induced to accept this as a solution of the

question. Is not carbonate of soda cheap enough? and is not the taste of the public to be listened to, when it demands aerated water, under the name of "soda water," which is not *soapy* in taste?

That it is desirable to attain to the highest standards practicable I do not dispute; on the contrary, I have always maintained that this is one of the objects of the pharmacist's education, but still there are times when the British Pharmacopoeia standard cannot be reached. Some medicines, for instance, are liable to change from the hour they are made; with others, again, a weaker form is found more convenient.

Fluid magnesia, for instance, can without difficulty, as I heard some years since ("Pharmaceutical Journal," vol. xi., 455), be made to agree with the characters of the Pharmacopoeia. But can it be kept so? Experience has taught many of us that it cannot, and therefore it is that it has been proposed that the strength shall be reduced to 10 grains of the carbonate rather than 13 grains to the ounce.

Sulphurous acid solution, again, is described officially as containing upwards of 9 per cent. of sulphurous anhydride. Now, an aqueous solution of this strength is known not only to be impracticable commercially, but also to be undesirable to handle as a remedial agent, and therefore it has been generally understood that a 5 per cent. solution would be substituted. Now, surely, because pharmacists act with some intelligence in these matters they ought not be subjected to the sweeping assertion that 28 per cent. of their drugs are adulterated.

DR. ANGELL: I came up to this meeting fully expecting that an attack would be made upon those whose duty it is to detect and certify to adulterations in drugs, but it has not proved so powerful as I had expected. A great deal I had intended to say has been much better put by Dr. Dupré, but there are one or two things I cannot pass over.

In the first place I should like to ask of Dr. Redwood to which of these two paragraphs he attaches more importance. This one:

"The Sale of Food and Drugs Act has opened a wide field for occupation to chemists who are engaged not only in the duties of Public Analyst, but also in those of checking what may be thought to be the too eager assaults of official prosecutors acting under the authority of this Act."

Or :

"The maintenance of a high and uniform standard of quality in drugs including under this term all medicines, is of the utmost importance, not only for insuring their safe and successful use, but for promoting the much-needed advancement of knowledge in therapeutics."

This is a simple question, but I am inclined to think he will find some difficulty in answering it.

A good deal has been said about the difficulty of obtaining the crude drugs in anything like a state of purity. I could not but smile when I came to the remark on page 4 about the wild state of the uneducated natives. Why the adulterations of tea were often blamed to the poor "Heathen Chinese," until the operation of the Food and Drugs Act put a stop to them.

We have heard how scammony is collected, and about the wind blowing pollen and starch grains on to the resinous juice, sometimes, as I have found, to the extent of about half. Scammony also sticks to the hands of the natives, and they are obliged to use 50 per cent. of flour to prevent it. I should like also to remark upon a statement in page 7, which says that —

"Notwithstanding the periodical investigations of inspectors and analysts appointed under the 'Sale of Food and Drugs Act,' and the vigilance of a numerous body of well-informed and scientific pharmacists in various parts of the country, who are fully competent for the detection of such cases, and always ready and anxious to discover and expose them, the number thus detected is very small."

I may observe on this, that however much vigilance these officers may use, it is exceedingly difficult to obtain samples of drugs. If an inspector goes into the shop of a grocer, he can demand articles under certain provisions of the Act; but if he goes into the shop of a chemist it is a fair question for the latter to ask: "What do you want it for?" and as the inspector is bound to tell them, then the remark is: "We have not any." That is the practical difficulty in carrying out the Act in regard to druggists. In respect to the observations on cream of tartar, it really seems to me that the British Pharmacopœia is taken up or put down exactly as the case demands.

If we refer to the article cream of tartar in the British Pharmacopœia, we shall find that the calcium present should produce only a slight turbidity with ammonium oxalate. I remember some time ago, when in court, putting to a well-known professor of pharmacy—the indefatigable defendant in cases of prosecution for the adulteration of drugs—the question as to “How much lime salt was indicated by the bare allowance of a slight turbidity with the reagent; was it as much as 8 or 9 per cent. of the whole substance?” “It is according to the strength of the solution,” was the only answer which could be got out of him. It appears to me that what Professor Redwood would like us to understand from his words is, that the pharmacopœia is to be adhered to when it is wanted by the pharmacist, and not when it is not wanted. Then he tells us if we were to demand cream of tartar in accordance with the test, that there would be very little cream of tartar left. We were once told in the same way that if we were to ask only for green tea which had not been painted, we should put an end to all green tea. Depend upon it, that if we were to demand cream of tartar in a fairly pure condition, it would be very quickly supplied to us. Then, with respect to the argument Professor Redwood has put forward with some force—the taste of the public. The taste of the public has always been used as an argument in support of all kinds of adulteration, and it is now somewhat out of date. It is really no defence at all. It has also been stated that it is impossible to fix upon standards, but it has now been found by the public analysts that there are few cases where the standard could not be determined.

PROFESSOR ATTFIELD: I may say that I came to this meeting with the intention, if necessary, of supporting Dr. Redwood, for I felt that I could concur in all that he had said in the proof of his paper. At the same time I was anxious to ascertain from his additional remarks and from the discussion, what evidence might be afforded respecting the adulteration of drugs. When I say I support Dr. Redwood, I mean more especially as to his statement that “with regard to the drugs consumed in this country, and supplied in the usual way by our

registered chemists and druggists, I am not aware, and do not believe, that anything like systematic or serious adulteration exists." I support him in this opinion, because for a great many years I have been looking for evidence of the alleged sophistication of drugs by druggists, but, hitherto, have found no degree of adulteration at all worthy of imperial recognition. Now, respecting this particular kind of adulteration, I do not know any language which would be too strong to express my abhorrence of it, in any form. An article of food may be adulterated and perhaps do no particular harm, because we are not bound to purchase or to swallow; and as buyers are to some extent judges, the principle of *caveat emptor* applies. But a drug is something to bring us back to health; we take it almost *volens volens*, and we suffer if it is adulterated;—hence any person who designedly adulterates drugs should be punished with the utmost rigour of the law. But where are these drug adulterators? I have been connected with the Pharmaceutical Society for some twenty-five years, and I know pretty well what was done by that Society for the previous fifteen years. In the forty years' proceedings published by that Society, I have looked in vain for evidence of anything like widespread or serious adulteration. I have found competent men coming forward with the results of their investigations, looking anxiously to find adulteration, but with little success. I am also connected with a similar society, the British Pharmaceutical Conference, which has taken up the question; one of the only two articles of its constitution stating that it is founded "to maintain uncompromisingly the principle of purity in medicine." In the earlier years of the existence of this body, steps were taken to obtain from most of the chief towns of the country specimens of drugs for examination. Sometimes specimens were obtained from all the shops in one town, and sometimes from one shop in each of several different towns. Papers were written on the investigations, but what was the result? Scarcely a single case of adulteration could be detected; and the gentlemen who conducted the investigations were, so far as one could tell, men of skill, reputation, and probity. Since the Food and Drugs Act has been in operation, I

have looked in the reports of the public analysts and of the Local Government Board for evidence, but, again, have found very little. It is true that the report of the Local Government Board, quoted by Dr. Redwood, states that nearly 28 per cent. of the samples examined were adulterated, but this statement must be taken *cum grano salis*. If it be true that such large proportions of the drugs examined were adulterated, how is it that a large number of prosecutions were not instituted? Prosecutions have in some instances been undertaken, but of these a large proportion has broken down. I myself, although as I have said, I hate adulteration, have always willingly taken part in the defence of cases which, to my judgment, were only cases of *alleged* adulteration, and the results have justified my opinion. It is all very well to say that chemists who have defended such cases, have taken too much the position of advocates. There is a *tu quoque* statement which might well be applied to those who supported the prosecutions. The fact however stands, that after hearing fairly typical cases, including a solicitor and an analyst on one side, and a solicitor and an analyst on the other, impartial tribunals have found most of the asserted charges of drug adulteration to be without proper foundation. To the credit of chemistry be it said that the analyst, as an analyst, has seldom been in fault, the failure to sustain the charge resting generally on the deductions from the analyses rather than on the analyses themselves. After looking for evidence of the adulteration of drugs, I cannot but come to the conclusion, not only from my own experience elsewhere, but from what I have heard, or rather, have not heard, in course of the discussion this evening, that there is in this country nothing like serious or systematic adulteration of drugs by druggists. I want to see evidence, not mere assertion, but evidence, either from the prosecutions or from papers brought before one of the many societies—the Pharmaceutical Society, the British Pharmaceutical Conference, the Chemical Society, the Society of Public Analysts, or our own Society, so that the question of adulteration or non-adulteration by the British Pharmacist, may be incontestably and truthfully settled.

DR. MUTER : I have listened with interest to hear what the

speaker who has just sat down would say upon the subject under discussion, because he has certainly been amongst those referred to by Dr. Redwood for whom work had been found to check the assaults of too zealous prosecutors. He is, as it were, a representative defence analyst, and therefore, in following him, I mean to confine my remarks to the manner in which the decisions of the impartial judges referred to by him have generally been obtained, and to the effect on the public welfare of such specious excuses for the existence of inferior and impure drugs, as we have heard to-night from some speakers. I am quite willing, at the outset, to admit, that, as a rule, the most inferior drugs are not to be found in the shops of pharmaceutical chemists, but in those of oilmen and other unlicensed dealers, who do a trade in the commoner drugs, at prices far below the regular retailer. On the other hand, I am also bound to say that the educated men do not always exercise the care they are supposed to do, in checking the quality of the drugs they buy, before retailing them. The truth is, however, that the whole thing begins with wholesale houses, who positively encourage the sale of inferior articles, by supplying cheap drugs to the unlicensed persons, and so acting to the prejudice of the regular pharmacist. I would ask any man in his senses what it means when one sees in a wholesale price list the same drug marked "opt," "medium," and "sorts." Is it not that the first is the proper and only admissible article up to a proper strength, while the second is not so, and what the third is I must leave to imagination. Drugs are not like groceries, they must either be of full strength and purity, or worthless, and so they cannot be honestly judged by ordinary trade qualities. Addressing myself now to the prosecutions which have failed, let me present you with a picture. Never was there a case in which the defendant was wealthy, but that a grand array of our friends, the professional defence analysts, were brought down, while the unfortunate country public analyst was left alone, often without even the semblance of legal assistance. The inspector gives evidence, and the analyst gives his, and then up gets the talented barrister, retained, regardless of expense, by the Defence Associa-

tion. He severely cross-examines the public analyst, whom he addresses simply as Mr., no matter what his title may be, and he then dilates upon the meagre nature of the evidence for the prosecution, and introduces his witnesses with a grand flourish, and examines them by the title of professor this, or Dr. that. The consequence naturally is, that the "impartial judge," knowing nothing of the real nature of the point in dispute, goes simply by the weight of evidence, which is represented on the one side by a mercilessly cross-examined "Mr.," and on the other by a Professor or two not cross-examined at all by any one competent to do so, and naturally he decides in favour of the views promulgated by the latter. It seems to me that the entire tendency of professional defence evidence has been to reduce the standards of purity in everything, and consequently the public suffers. Take, for instance, the simple question of milk, and we find that, under this treatment, the standard has been steadily going down, so that we really now get a more constantly diluted article than before the passing of the Act. With the standard to which we have now been reduced, most dealers can and do regularly add 10 per cent. of water without fear of conviction. One word more and I have done. Dr. Attfield said, I think, that no evidence as to the qualities of drugs had been brought before any society. I can say something very different to that, because I have sat in this room, as President of the Society of Public Analysts, and heard papers on the subject read and discussed; and surely it must be admitted that such meetings were composed of men who understood something, at least, of the subject which is their daily occupation, whatever our defence friends may say to the contrary.

DR. DUPRE : I should like to say a few words as regards the question of citrate of iron and quinine. I have analysed many specimens taken from all parts of London, at respectable shops, and not one out of three came up to the standard of 16 per cent. In some cases it fell to six or even four. Not many years ago there were wholesale houses in London at which three qualities were kept, and the excuse was that these were manufactured because the country practitioners required them. As long as

wholesale firms send out drugs of different qualities, there is no possibility of ensuring quality.

MR. UMNEY thought that public analysts had done much good in recommending prosecutions for the sale of cream of tartar which contained barium sulphate, but that they failed in discretion when prosecutions were instituted on account of so-called abnormal amounts of calcium tartrate occasionally present. Then, again, neither the wholesale nor retail druggist was directly responsible for the cream of tartar with barium, for, as Dr. Paul pointed out, the process of *salting* or sprinkling in of the sulphate as the crystals were packed in casks was carried on in the ports of Southern Europe. However, even this was a thing of the past, for it was now thoroughly stamped out. With regard to citrate of iron and quinine, he should like to add that it was the custom of manufacturers to make preparations containing 8 per cent. and 16 per cent. of quinine respectively, and it was sold so labelled, and therefore those who bought it did so with their eyes open. He maintained that wholesale druggists and manufacturing chemists were as much interested in, and evinced an equal desire to maintain, the purity of all substances used in medicines, as did pharmacists themselves.

THE SECRETARY then read the following letter from Dr. Stevenson:—

“Dr. Redwood argues to this effect: that the introduction of standards of strength and purity into the pharmacopœia took place before the passing of the Sale of Food and Drugs Act; that the pharmacopœial standards were not intended to be applied with reference to the general sale of drugs; and that those standards are to be regarded, in some instances, as standards of excellence to be reached rather than those practically attainable at present. He thus reiterates what has been urged by the pharmaceutical journals on behalf of pharmacists who object in their sale to be bound by the British Pharmacopœia, except when dispensing the prescriptions of medical men.

“I think it is to be regretted that such arguments are put forth on behalf of pharmacists, and I doubt the wisdom of their

endorsing such a line of argument, even if their own interests only are regarded. The public will, I hope, jealously watch any attempt to reduce the quality of drugs and substances used in pharmacy.

"In his certificate of analysis, the public analyst is obliged to state either that a drug is genuine or that it contains foreign ingredients, and to specify the percentages of these. He is not, as Dr. Redwood seems to imply, required to speak of a drug as 'adulterated.' It is clear, then, that he must refer, either expressly or by implication, to some standard of purity, natural or laid down by some competent authority. Now, what recognised standards have we for drugs and medicaments? I know of none but the British Pharmacopœia. And what is its authority, and how far does it apply? It is declared by statute to be intended to supersede all the different pharmacopœias before used in Great Britain; it is intended, so it is declared, to afford, not only the members of the medical profession, but those engaged in the preparation of medicines also, one uniform standard and guide. This being so, and all other pharmacopœias being superseded by the British, when a pharmacist, or any one selling a medicine or drug, is asked for a drug or medicine under a pharmacopœial name, the buyer is entitled to receive the article of the pharmacopœial quality, and of no other except when specially demanded.

"It might be supposed that as Dr. Redwood is one of the gentlemen who prepared the British Pharmacopœia, his opinion that the pharmacopœial standards are rather standards of excellence to be reached than those at present practically attainable, is conclusive as to this. But his opinion is, I believe, erroneous; or if not so, he must, when he assisted in drawing up the book, have been ill-informed (which I can hardly think), or else he greatly misunderstood the purport of the work he was engaged on. Let the Pharmacopœia speak for itself. It says:—'Pains have been taken to make the descriptions of all the substances referred to in the work, sufficiently comprehensive and minute to afford a clear indication of what the medicines of the Pharmacopœia *are intended to be.*' And since the book is by statute to

be a list of medicines and compounds, the term medicines must include drugs. And it adds that its object is 'to enable those who are engaged in their administration to determine the identity and test the purity of *such as are met with in commerce.*' It appears to me that the book is intended to treat of commercial articles, and in this I am further confirmed by the further statement of the book itself, which says, 'it is left optional with the manufacturer to use the processes given, or others by which products may be obtained *that will accord with the descriptions and tests given for their identification.*' It appears to me that Dr. Redwood's statement that the Pharmacopœia lays down ideal and usually impracticable standards of purity is strangely at variance with the declarations of the Pharmacopœia itself.

"Will pharmacists venture to lay down authoritatively a book of standards of purity below those of the British Pharmacopœia? Until they have the courage to do this, and drive people into demanding the pharmacopœial articles, I think public analysts and magistrates will do well to abide by the standards laid down by Dr. Redwood himself in the British Pharmacopœia."

PROFESSOR REDWOOD, in reply, said: The discussion which has taken place on this subject has been in no respect more severe in criticism than I was prepared for, but I have looked in vain to what has been said for evidence of adulteration of drugs other than that which I have myself admitted. I do not say that no such thing as adulteration exists, but I do say that we have no evidence of any serious systematic adulteration, such as we know has existed and still exists with reference to articles of consumption in connection with food. I may appeal to what Dr. Dupré has said as the result of his experience, which is to the effect that when he obtains from pharmacists articles such as quinine, iodide and bromide of potassium, or other well-defined chemical products they are pure; but he contends that when he departs from that course and examines drugs in their crude state he finds evidence of what he terms adulteration, but which I should rather regard as impurities, admitted impurities, necessary impurities, which are abundantly covered by the qualifications

introduced into the Sale of Food and Drugs Act. Dr. Dupré has alluded to scammony and cream of tartar, and I contend he has not in the slightest degree altered the position which I laid down, that cream of tartar, although formerly not difficult to meet with containing not more than 2 or 3 per cent. of tartrate of calcium, was at the present time rarely found in that state. Dr. Dupré has also alluded to citrate of iron and quinine, to which a reply was made by Mr. Umney. I have not referred specially to citrate of iron and quinine, but I am well aware that it is met with in commerce not of the full strength ordered in the Pharmacopœia. Such an article was a common article of commerce previous to the issue of the Pharmacopœia. Medical men were constantly using it with 7 or 8 per cent. of quinine in it; and seeing that medical men are large consumers of that article, and have a perfect right to use it of any strength they think proper, manufacturers will, of course, supply it. Therefore, the supply, under existing circumstances, of two perfectly different strengths. Dr. Dupré asked me to state whether I still adhered to the opinions which he says I expressed in a letter in the "Pharmaceutical Journal" some time ago, to the effect that the standards of strength given in the pharmacopœia are to be taken as minimums and not as maximums of impurity. I have already sufficiently answered that in print, but I would not wish the suggestion thrown out by Dr. Dupré to pass without my repeating what I have already said in my paper, namely, that in many instances, as with cream of tartar, the standard is that of the minimum of impurity which is to be met with in the article. I have explained my meaning more fully in this paper by indicating standards in the Pharmacopœia in other cases which are of a similar description. Thus, the carbonate of potash of commerce is, of course, never pure, but contains sulphate and chloride, which are necessary impurities in the article as obtained from wood ashes; and if we were driven to the employment of none other than pure carbonate of potash, the result would not be any advantage in its use in medicine, while the price would be enormously increased. One speaker stated that many wholesale houses had a practice of keeping drugs of various qualities, and

he seems to consider that it is wrong to supply drugs excepting when they are of the best possible quality. From this I entirely differ. Anyone who has had a large experience in drugs knows that what applies to articles of diet must also apply to drugs. What would be said in justification of a statement that "Here are tea and coffee and sugar sold of different qualities? Surely, this is altogether wrong; why should we have two or three qualities, why not confine ourselves to the best?" There is not the same difference in the qualities of drugs as in articles of food, but still some differences inevitably exist. Take, for instance, an article in the borderland ginger. Is it possible that all ginger is or could be kept to one standard? The same may be said of rhubarb or any other drug of that description. Of course, these drugs are imported in quantities; they are classed according to their several qualities, and they are sold according to such qualities. And we must also bear in mind that these drugs are not all used by the same class of individuals. It would be unjust if the lower classes were compelled to pay ten or twenty times the price for medicine they now pay. If all the inferior qualities of drugs were turned out of the market and none but the very best sold, they would undoubtedly suffer. These are all questions of which those in commerce have to take notice, and only those inexperienced in drugs would maintain that only one quality should be used.

THE PRESIDENT: I have not much to add, from my own experience, bearing upon the subjects of the interesting discussion to which we have listened, yet I feel it would not be right to refrain from telling you the impression made upon my mind by the perusal of Dr. Redwood's paper, and the discussion which it has elicited, especially as I approach the subject from the point of view of one who has never been concerned professionally with questions relating to the quality of drugs retailed, and their relations to existing standards, and who should, therefore, be in a position to express an unbiassed judgment. It seems to me to have been forcibly demonstrated this evening that much remains to be done by the Pharmaceutical Society, by the Society of Public Analysts, and by the Fellows of this Institute, to raise the

quality of drugs and medicinal chemicals, and to establish and maintain such standards of purity and strength as we should desire to see governing their supply to the public. I quite believe Dr. Redwood's statement, which was supported by Professor Attfeld, that wholesale direct adulteration of drugs does not exist, but I consider that Dr. Dupré put the subject in its true light, when he said it was not so much a question of adulteration, as of whether the articles supplied to the public are of such quality as they have a right to demand. If the same unavoidable competition existed in consequence of a public demand for cheap drugs, as there is in the case of articles of food, we might admit that such excuse as existed for the sale of inferior articles in the one case might also apply to the other. But surely a public demand for cheap drugs does not exist. I believe the public pay without grumbling the most liberal prices demanded for medicines, and, therefore, they have a right to demand the supply of articles concerning the quality and proper strength of which there is no doubt. It has been argued that two qualities of citrate of iron and quinine must of necessity exist, because one medical man has been accustomed to prescribe the article of inferior strength, and another the superior article, but is it not very possible that a dispensing chemist may not be able to refrain from yielding to the temptation of keeping only the inferior quality, so that the patient may not actually get what the medical man thinks he is prescribing? I repeat that the public have a right to expect the article sold to be of the highest quality, and that he runs great risk of not obtaining this if the dispensing chemist has the option of purchasing several qualities of a drug or chemical, the standard of quality or strength which is laid down in the pharmacopœia. It has been said that the wholesale druggist is obliged to meet the demand for lower qualities of drugs; if so, it obviously rests with the dispensing chemist and druggist whether these inferior articles are manufactured or not. Surely if, as Professor Redwood says, it is the practice to manufacture paregoric which contains no opium to meet the demands of a particular class of salesmen, a gross deception is practised upon the purchaser, who expects to obtain the

article known as paregoric, and, perhaps, prescribed to him as such. The existence of this practice of the supply of inferior qualities of drugs, alone shows that very important reforms have to be made in connection with this subject. Dr. Redwood has pointed out the importance of raising the standard of the scientific qualification of those engaged in this department of commerce. What we also require on their part is firm rectitude of purpose and a discontinuance of the manufacture of articles, the existence of which may serve as temptations to yield to dishonest practices under the cloak of a supposed weakness on the part of the public for cheap supplies of medicine. I do think that the Fellows of this Institute, among which are many belonging to the Pharmaceutical Society and the Society of Public Analysts, have useful work to do in removing all spirit of antagonism between those Societies, and in bringing them to co-operate heartily and earnestly in the interests of the public, by doing their utmost to secure the adoption and maintenance of proper standards of strength and purity, and to encourage increased knowledge and commercial rectitude in those engaged in the manufacture and sale of drugs and medical preparations.

The proceedings terminated with a vote of thanks to Dr. Redwood.

LIST OF OFFICERS & COUNCIL FOR 1881.

PRESIDENT.

F. A. ABEL, C.B., F.R.S., &c.

VICE-PRESIDENTS.

JAMES BELL, F.C.S.

E. FRANKLAND, Ph.D., D.C.L., F.R.S., &c.

W. N. HARTLEY, F.R.S.E., F.C.S.

E. J. MILLS, D.Sc., F.R.S.

T. REDWOOD, Ph.D., F.C.S.

H. E. ROSCOE, Ph.D., F.R.S.

TREASURER.

C. R. ALDER WRIGHT, D.Sc., F.C.S.

ORDINARY MEMBERS OF COUNCIL.

JOHN ATTFIELD, Ph.D., F.R.S., &c.

DUGALD CAMPBELL, F.C.S.

A. DUPRÉ, Ph.D., F.R.S., &c.

R. J. FRISWELL, F.C.S.

P. GRIESS, Ph.D., F.R.S., &c.

C. W. HEATON, F.C.S.

DOUGLAS HERMAN, F.C.S.

J. F. HODGES, M.D., F.C.S.

DAVID HOWARD, F.C.S.

E. W. T. JONES, F.C.S.

T. W. KEATES.

C. T. KINGZETT, F.C.S.

J. W. KYNASTON, F.C.S.

F. A. MANNING, F.C.S.

W. ODLING, M.A., M.B., F.R.S., &c.

F. J. M. PAGE, F.C.S.

JOHN PATTINSON, F.C.S.

B. H. PAUL, Ph.D., F.C.S.

J. SPILLER, F.C.S.

T. STEVENSON, M.D., F.C.S.

A. NORMAN TATE.

C. MEYMOTT TIDY, M.B., F.C.S.

W. A. TILDEN, D.Sc., F.R.S., &c.

R. V. TUSON, F.C.S.

A. VOELCKER, Ph.D., F.R.S., &c.

W. WALLACE, Ph.D., F.R.S.E.

T. WAY, F.C.S.

SECRETARY.

C. E. GROVES, F.C.S.

INSTITUTE OF CHEMISTRY

OF

GREAT BRITAIN AND IRELAND.

REPORT OF COUNCIL.

As at all former Annual General Meetings, it is again the pleasing duty of the Council to congratulate the Members on the progress which the Institute has made during the past year in regard to the increase in their numbers. At the time of the last Annual Meeting, there were on the Register, 370 Fellows and 54 Associates, whilst at the present time there are 422 Fellows and 51 Associates, besides 5 Fellows who have been recently elected, but not yet formally admitted, making in all 478 Members. During the past year we have lost 4 Fellows by death, Mr. A. C. Bruce, M.A., of Birmingham, Mr. Thomas Eltoft, Dr. J. Stenhouse, F.R.S., one of the Founders of the Chemical Society, who died on the last day of the old year, and Mr. W. W. Stoddart, of Bristol. One Fellow and one Associate have resigned. The power intrusted to the Council on the foundation of our Association of admitting candidates directly to the Fellowship without first passing through the grade of Associate, ceased on the 2nd of October last; so that many Chemists have recently availed themselves of the opportunity of joining the Institute as Fellows under those conditions. Several Chemists who were invited to become Members at the time of the foundation have also taken up their Fellowship.

With reference to the satisfactory total increase in our numbers during the past year, it must not be overlooked that this is due to the direct admission of Chemists to the Fellowship under the special regulations which have now lapsed. By our Articles of Association, every candidate applying to be admitted as a Fellow after October 2nd, 1880, must give evidence—

1. "That he is not less than 24 years of age.
2. "That he has been admitted to the Institute as Associate.
3. "That he has, since his admission as an Associate, and
 "for a period of three years therefrom, been con-
 "tinuously engaged in the study and practical
 "work of Applied Chemistry in a manner which
 "shall be satisfactory to the Council."

From this time forward, therefore, our numerical increase will depend on the number of candidates for the Associateship who give satisfactory evidence that they have the necessary qualifications.

The conditions under which candidates for the Associateship of the Institute are in future to be considered eligible for admission to the examinations, have recently been the subject of careful consideration by the Council, as also the question to what extent the examinations as hitherto carried out need to be modified or amplified. As the attendance in London for the required practical examination may entail considerable inconvenience and expense upon candidates for the Associateship residing in Scotland or Ireland, it is under consideration as to whether—where special circumstances arise—it may not be expedient to arrange for examinations in Practical Chemistry in connection with the Institute, to be held at the great centres in those countries, and perhaps also in the provinces.

The prize of £50 offered by our late President, Dr. Frankland, for the best original investigation involving gas analysis, has been awarded to Mr. Frank Hatton for his researches—

- I. "On the Action of Bacteria on Various Gases."
- II. "On the Oxidation of Organic Matter in Water by
 Filtration through Various Media."

III. "On the Reduction of Nitrates by Sewage, Spongy Iron, and other Agents."

These have been accepted by the Council as sufficient and satisfactory evidence of training in Practical Chemistry to entitle him to the Associateship.

Since the last Annual General Meeting, Conferences have been held at which questions of considerable importance were discussed, namely:—

"What should be the Relation of Professional Chemists to each other, to their Clients, and to the Public in legal cases?"

"On Standards of Strength and Purity, and Evidence of Adulteration in Drugs."

The decision of the Council to print the papers in which the subjects of the Conferences were to be introduced and to circulate them amongst the Members some time previously has been found to be very useful; not only has it enabled the Members attending the Conferences to carefully consider the subject for discussion before the meeting took place, but Members who reside out of London, or who from other causes were unable to attend, have sent letters to be read at the Conferences, expressing their views on the matter under consideration.

The Parliamentary Committee, with the assistance of the Parliamentary Agents of the Institute, have carefully watched the various Bills brought forward in Parliament during the last session, but there were none which seemed likely to affect the interests of Members of the Institute. The advisability of getting an Act of Parliament passed for the incorporation of the Institute has been under discussion by your Council, as it is considered that in this way the objects and aims of our Association would be brought under the notice of various official bodies in a more forcible manner, whilst additional status and influence would thus be acquired by the Institute.

The Institute is indebted to the President and Council of the Chemical Society for the use of their rooms during the past year.

PRESIDENT'S ADDRESS.

THE PRESIDENT said : The Report of the Council, which you have just heard read, records a condition of prosperity and a promise for the future such as, I believe, few societies or associations of the character and age of our Institute, have been able to boast of. In October last we completed the third year of our existence as an incorporated association, and with that completion ceased the admission to our Fellowship of any but those who shall have attained to and passed through the preliminary grade of Associate.

While the total number of our Members is within about twenty-five of the maximum fixed for the purposes of our registration, an inspection of our Register by those extensively acquainted with the profession will afford satisfactory proof that, in regard to the admission of Fellows, which, until lately, has been to a great extent at the discretion of the Council, a good standard of competence and of professional position has been maintained. In the admission of Associates, the Council, guided by its Nomination Committee, has also carefully maintained the standard of qualification laid down in the Articles of the Institute.

There is good cause to congratulate the originators of the Institute on the fact that but few men of eminence as scientific or professional chemists have not borne testimony, by taking up the Fellowship which was open to them until October last, to their correct conception, and consequent approval, of the objects with which this professional Association has been founded. Most sad it is that, amongst the prominent names upon our Register, we should so soon have to miss that of one of the most eminent and most highly respected men who joined the Institute on its foundation. As a professional chemist, no less than as an enthusiastic investigator, whose love for the science raised and sustained him above difficulties to which very many would have speedily have succumbed, and as a man especially distinguished for his high

moral principles and his fearless candour, the late Dr. Stenhouse occupied for many years a very exalted position among his fellow-workers. His approval of the aims with which this Association was founded, went far to counterbalance the adverse criticisms of a few whose opinions are entitled to great respect, but who do not appear to have rightly or fully understood the views which have led many leading chemists to co-operate zealously with younger members of the profession in endeavouring to establish this professional Association upon a sound and firm footing.

I venture to think it must be admitted to have been demonstrated that those endeavours have already been crowned with success, not merely by the anxiety exhibited by a considerable number of well-qualified professional men to join our body, after the first general selection of Fellows had been made, but also by the readiness with which young members of the profession have already presented themselves for examination, with a view to qualify for the position of Associate of the Institute. That the examination for admission to our Association is already taking its place among recognised public examinations must, I consider, be regarded as one important result achieved by those whom you select to watch over the interests of the Institute; and if, while affording all reasonable facilities to candidates to present themselves for examination, we can succeed, by judicious revision from time to time of our regulations governing the admission of Associates, in improving, not only the preliminary chemical education, but also, and I might say especially, the general scientific training of young men who enter the profession, we shall, I consider, have accomplished one of the *most* important and useful objects which many of the more earnest workers in the interests of the Institute had in view when they originally joined the movement for its establishment.

It is doubtless considered by the majority of professional chemists who have become Fellows of the Institute, that the annual subscriptions paid by them serve their chief intended purpose by contributing to the accumulation of funds, wherewith important work for the advancement of the best interests of the

profession may, in the future, be accomplished. It has, however, come to the knowledge of your Council that there are among our numbers a few who already look for some immediate substantial return for the subscriptions paid year by year, or who consider that some palpable personal advantage or benefit (concerning the nature of which no well-defined idea appears to exist,) should at once accrue to subscribers to the Institute.

As the few observations which I am now offering are submitted solely on my individual responsibility, I will venture to remind such members that the Institute can only be said to have been just launched into existence, and that very much remains to be done towards the full development of its character and its sphere of action.

I would add that it counts among its members men eminent as scientific and professional chemists, who have joined it simply with the object of giving both material support and the support and influence afforded by their names, to an Institution, the successful development of which they hope, in course of time, to see operate beneficially upon the welfare and social position of the profession at large; who not only cannot be expected to reap any personal benefit from their connexion with the Institute, but who have moreover demonstrated their readiness to expend much valuable time in endeavouring so to bring its foundation to a successful issue as to establish, on a firm basis, an Association truly representative of the chemical profession and of the interests of its members. If these men are cheerfully content to labour for the Institute, besides contributing to its funds, those whose sole object in becoming members was to reap personal benefit from their association with it may surely be content to exercise some patience. They should, moreover, not lose sight of the fact that the power and influence enjoyed by old-established representative Associations of other professions, which do at once convey privileges to those elected into their body, have been of gradual growth and development.

I may, at the same time, remind the members that their Council has continually given its earnest attention to the subject of

securing increasing advantages to those who have joined the Institute. Thus, it has been indicated in the Council's Report that the practicability of securing some additional status to members by obtaining an Act of Parliament for the incorporation of the Institute, has been considered, and this subject will have to be dealt with by the new Council. Our Register is advertised from time to time, as also are new elections made. The Register is sent to Government authorities and public bodies who have to deal with chemical appointments, and means will be adopted to direct attention to it in all instances when vacancies in chemical appointments arise. It need scarcely be pointed out that it rests greatly with individual members of the Institute to disseminate a knowledge of its existence and objects, and thus to contribute towards securing for themselves the advantages resulting from its gradual recognition by the public as the representative Institution of the profession, which operates in the interests of the public by examining into and vouching for the qualifications of the practical chemists enrolled upon its Register.

Your Council has further endeavoured to promote the objects of the Institute by occasionally convening meetings of its members, or Conferences, for the purpose of discussing topics of special interest to the profession, and we are much indebted to some Fellows who have taken the trouble to prepare papers to serve as starting points for these discussions. The attendances at these Conferences have not been large, and it is to be hoped that in the future those members who are able to attend meetings in London may more generally endeavour to benefit their colleagues and themselves by taking part in the interchange of views at such meetings, on matters involving diversities of information, experience and opinion. To those who are unable to be listeners or speakers at these meetings, the circulation of the papers read and of the proceedings thereon has probably been of some use and interest. Among the subjects which will certainly occupy the attention of future Councils will be the questions, whether more frequent meetings of the members may be organized with prospect of general approval and success; and whether some form of

periodical publication may be issued, distinct in character from that of a purely scientific journal, (the demand for which is so completely met by the journal of the Chemical Society,) but dealing with matters of special interest to practising chemists. The establishment of such a periodical would of course create a more or less considerable demand upon our resources, and the question will therefore need careful consideration,—when and to what extent it may be prudent to incur such pecuniary responsibilities, so as to avoid the crippling of resources which should be always available towards furthering objects of more direct importance to members of the Institute.

In concluding these few remarks I would again lay stress upon the fact that, as an earnest of the beneficial work which this Institute aims at accomplishing, it is doing its best, by stipulating for special, well-defined, qualifications, the standard of which should be gradually and judiciously raised, to fulfil the first object of the Association as laid down in our Memorandum, namely:—To promote and encourage a thorough study of Chemistry and all branches of Science allied thereto, in their application to the Arts, to Agriculture, to Public Health and to Technical Industry.”

The zeal and success which have, up to the present time, marked the labours of those who have acted as your Council may, I venture to think, be accepted by members as proof that no pains will be spared, nor time lost, in endeavouring to secure the second of the declared objects of the Association, by “adopting,” or seeking to promote the adoption, of all legitimate measures “for the advancement of the profession . . . and particularly for the maintenance of the profession of the Consulting and Analytical Chemist on a sound and satisfactory basis.”

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

THE REPORT OF THE COUNCIL
AND
BALANCE SHEET FOR 1881,
TOGETHER WITH THE
ADDRESS OF THE PRESIDENT,
PROFESSOR ABEL, C.B., F.R.S., &c.

London:
PRINTED BY A. P. BLUNDELL & CO., 26, GARLICK HILL, E.C.

1882.

INSTITUTE OF CHEMISTRY

OF

GREAT BRITAIN AND IRELAND.



REPORT OF COUNCIL.

THE Council has to congratulate the Members, as on former Annual General Meetings, on the continued prosperity of the Institute.

At the time of the last General Meeting there were on the Register 412 Fellows and 51 Associates, whilst at the present time there are 412 Fellows and 47 Associates, besides one Fellow and one Associate who have been recently elected but not yet formally admitted. During the past year we have lost one Member by death, Mr. A. E. Arnold ; five Associates have become Fellows ; and five Fellows have resigned.

The qualifications required of Candidates for admission to the Institute have been carefully reconsidered, with especial reference to the three years' training required by the Articles, and it has been decided that after October, 1883, every Candidate will be required to produce evidence :—

That he has passed satisfactorily through a course of three years' study in any chartered or incorporated Colleges or Schools previously approved by the Council, in the subjects of Theoretical and Analytical Chemistry, Physics, and Elementary Mathematics.

That he has passed such examinations in these subjects at such Colleges and Schools as the Council may from time to time

direct, or that he has passed the examinations of the Science and Art Department as prescribed by the Council. If the evidence of training is considered by the Council to be satisfactory, the Candidate will then be admitted to the practical examination conducted by the Examiner appointed for that purpose by the Council.

Since the last General Meeting, a Conference has been held "On certain points in the Ethics of Professional Chemistry," the subject being introduced by Professor FRANKLAND, but only a few of the questions raised in the paper were discussed. It is proposed to consider the others at an adjourned meeting.

In addition to the Conferences, the Council propose that a series of experimental demonstrations should be given, illustrative of modern methods of analysis, and of physical operations more immediately connected with our branch of science. The first of these "On Modern Methods of Gas Analysis, and the Apparatus employed therein," has been undertaken by Mr. ROBERT WARRINGTON, and will shortly be delivered.

The Council has most carefully considered as to whether it is advisable in the present state of the Institute to publish a journal which should be sent periodically to the Members. Such a journal might contain :

1. Original articles on subjects of professional interest.
2. Reports of Conferences.
3. Original communications.
4. Short reports of Law Cases in which Professional Chemists are engaged as experts.
5. Full reports of new and important Analytical Papers published in foreign journals.
6. Accounts of new or improved manufacturing processes.
7. Chemical Patents.
8. Correspondence.

If the services of a competent Editor could be secured, such a journal might be made very useful to the members, so that the

question mainly resolves itself into one of cost. At the lowest estimate, a journal of the kind indicated could not be published quarterly for less than between £300 and £400 per annum. The balance of the Society's income over expenditure is, however, but little more than £400, and, considering how important it is for an Institution like ours to accumulate funds, it would, in the opinion of the Council, be unwise to expend the available income upon publications.

Dr. C. MEYMOTT TIDY's prize of £25 for the best original investigation on "Special Reactions of the Alkaloids, and their Separation from Organic Mixtures," has not yet been awarded, and is still open to competition, not only to Associates, but to all persons, except Fellows of the Institute, who shall before the 31st December next have qualified themselves for the Associateship in all respects short of passing the prescribed practical examination.

The Institute is indebted to the President and Council of the Chemical Society for the use of their rooms during the past year, as on previous occasions.

INSTITUTE OF CHEMISTRY OF GREAT BRITAIN AND IRELAND.

STATEMENT OF ACCOUNT AND BALANCE SHEET,

FROM 1ST JANUARY TO 31ST DECEMBER, 1881.

[illegible]

Audited and found correct,

Jan. 4th, 1882.

RAPHAEL MELDOLA.
CUTHBERT G. NEISON.
JOHN M. THOMSON.

PRESIDENT'S ADDRESS.

The President was accidentally prevented from delivering this Address to the Members on the occasion of the Anniversary Meeting. It has been printed in conformity with a resolution of the Council.

ALTHOUGH the year which has passed since it was last my privilege to address the Members of the Institute on the subject of its affairs has not been a very eventful one in the history of this young society, there are some topics connected with, or bearing upon, the labours of the Council during the last twelve months which should possess special interest for us, and in reference to which I may therefore perhaps usefully offer a few observations supplementary to the statement of facts presented by the Council's Report.

The Institute having entered upon a new stage of its existence shortly before the last anniversary, consequent upon the expiration of the term during which Fellows could be admitted into the Society without passing through the preliminary grade of Associate, the newly-appointed Council deemed it one of its most important duties to reconsider carefully the prescribed qualifications of candidates for admission to the Institute. Strongly impressed with the great advantage which the acquisition of some mathematical knowledge, besides sound preliminary training in physical science and in theoretical as well as practical chemistry, must be to young men embracing chemistry as a profession, the Council considered that particular stress should be laid upon the condition, that the admission of a candidate to the practical examination (prescribed as a qualification for the grade of Associate) must depend upon his producing clearly defined evidence of the desired preliminary training. A careful discussion of this subject by a Committee of the Council led to the conclusion that the best evidence which the candidate could be called upon to furnish of his having satisfactorily passed through such training, would be the production, by him, of proofs to that effect in the shape of

certificates from the authorities or professors of Universities, or of incorporated colleges or schools recognised by the Council, or of certificates of the Science and Art Department, relating to particular grades of examinations approved of by the Council. Careful consideration is therefore being given to the preparation of a list of recognised colleges and schools for the information of candidates, which it is contemplated to make as extensive as is consistent with the necessity for guarding against the existence of any foundation for the possible suggestion that individual interests connected with educational establishments are favoured by the Institute, and of securing publicly recognised official guarantees of the qualifications of candidates.

It is perhaps scarcely to be expected that the number of young men presenting themselves annually for admission into the Institute should, for the present, greatly exceed those of the past two years; at the same time it is probable that the objects of the Society, and the interests of those who may contemplate devoting themselves to chemistry as a profession, would be promoted if colleges and other educational bodies were, in their calendars or similar publications, to direct attention to the requirements of the Institute, and to the special nature of studies which should be pursued by those preparing for the Associateship. The Mason Science College, of Birmingham, has set a good example in this direction, having published in its calendar for 1881-82 a syllabus of the subjects which have been included in recent examinations in practical chemistry of candidates for admission to the Institute, as well as suggestions with regard to the course of study to be pursued by students of that class.

The generally scanty attendances at the Meetings or Conferences which have been held for the purpose of discussing subjects of special interest to the profession has led the Council to consider whether other means could be resorted to which might prove more successful in securing occasionally-attended meetings of the Society. The suggestion was made by one of their number that many of us would be glad to have the oppor-

tunity of attending experimental demonstrations of particular analytical processes, or physical operations, not commonly practised by professional chemists, a practical acquaintance with which might at any time prove useful or necessary. The Council considered the holding of such demonstration to be an experiment well worthy of trial; they have therefore gladly availed themselves of the valuable services of Mr. Robert Warington, who has agreed to hold the first of these demonstrations on a subject of very general interest and importance. It is intended that a suitable honorarium should be paid to gentlemen undertaking these demonstrations, and several subjects of interest have suggested themselves, which appear likely to afford matter for instructive meetings.

I ventured, in the remarks which I offered at the last Anniversary Meeting, to suggest, as a question worthy of consideration, whether it would be compatible with the primary objects of the Institute, or conducive to their promotion, for the Council to undertake the publication of a periodical. Some observations, afterwards submitted to the meeting by an exponent of the views of a number of provincial Members, demonstrated the desirableness of a thorough examination into the subject, and the results of the Council's deliberations therein are given in the Report which you have heard read. It will, I conclude, be evident, from the statement submitted, that the Council cannot attempt the periodical issue of a publication of a sufficiently useful and comprehensive nature to be acceptable to the Fellows and worthy to be styled the Journal of the Institute, except at a cost which would absorb almost the entire revenue of the Society.

Meanwhile, however, active steps have been taken in another quarter for the publication of a new periodical which bids fair to furnish to professional chemists much of the information which could be embraced in the contents of a Journal of the Institute, as sketched out in the Council's Report, and which may also become the vehicle for the publication of original communications or of correspondence from Fellows. It may therefore be desirable

for your new Council to consider whether it might not be agreeable to the Members of the Institute that arrangements be made for the gratuitous supply to them of the "Journal of the Society of Chemical Industry," of which the first number will shortly appear, that Society having succeeded in establishing a guarantee fund more than ample to cover the first year's outlay upon their Journal.

There is no doubt that this new periodical will deal very comprehensively with matters of special interest and importance to industrial and professional chemists, and that great pains will be taken to make it in every respect a worthy companion to the matchless Journal of Scientific Chemistry and Chemical Physics, published by the Chemical Society, so that the wants of all branches of the profession are likely to be completely met by these two periodicals, and any special publication which the Council of the Institute can supply to its Members in addition to the new journal just referred to, if this be determined upon, can only consist of matters relating to the transactions and condition of the Society.

The foundation of the Society of Chemical Industry, which, though not yet twelve months old, is already in very active and vigorous operation, may be considered as mainly due to the exertions of a number of Fellows of the Chemical Society and of the Institute of Chemistry who have found that the constitution of neither Society was such as to enable it to supply the growing want felt by men engaged in connexion with the great Chemical and allied Industries of this country, of frequent opportunities to exchange opinions and information with their fellow-workers in different parts of the kingdom, and of a good English publication dealing specially and comprehensively with all that relates to technical chemistry.

It would appear, although it is not easy to understand how this should have come about, that some few of our Fellows, who are connected with chemical or allied manufactures, had entertained expectations that the Institute of Chemistry should, to some extent

at any rate, have fulfilled those wants, and that its Members should, long ere this, instead of accumulating its resources, have devoted all available income to the distribution of some immediate substantial equivalent for the subscriptions paid. I ask to be allowed to remind those Members that the primary object of the original movers in the establishment of this Society, as put forth in the original proposal circulated, was "to ensure that persons adopting the profession of consulting chemists, or acting as analytical chemists for reward, are qualified by study and training for the proper and competent discharge of the duties they undertake" (I quote from the circular), and that this subject was very definitely formulated in our Memorandum of Association, the wording of which was most carefully considered, and which has been communicated to all who were about to become Fellows of the Institute. The objects of the Association, as there laid down, are :—

- (A) To promote and encourage a thorough study of Chemistry and all branches of Science allied thereto in their application to the Arts, to Agriculture, to Public Health, and to Technical Industry.
- (B) To adopt such measures as may be necessary for the advancement of the Profession of Chemistry, and particularly for the maintenance of the Profession of the Consulting and Analytical Chemist, on a sound and satisfactory basis.

It may be well also to remind the Fellows, that the movement which resulted in the establishment of this Institute, arose, on the one hand, out of a very strong feeling for the necessity of furnishing a guarantee to the public, that only properly qualified chemists should practice the profession, and, at the same time, of affording some means of protection to qualified practitioners; on the other hand, it sprang from a feeling of dissatisfaction, because the only title available as some such guarantee to the public, namely, that of Fellow of Chemical Society, was not of necessity any

indication whatever of the qualifications of the persons using it. It was because most careful discussions of the subject showed that the constitution of the Chemical Society could not, without modifications very difficult to carry out, admit of its supplying the want which had gradually arisen since the profession of the practising chemist had attained a footing corresponding to that of the medical practitioner, that this Institute was established.

When the functions of the Institute were most carefully and elaborately discussed and considered, no question was ever raised as to the desirableness of their including any which would be kindred to those fulfilled by the Chemical Society on the one hand, or which on the other hand the Society of Chemical Industry (or of Chemical Engineers, as some would have had the new Society called) bids fair to carry into effect. The "doing of all such other lawful things as are incidental or conducive to the promotion and encouragement of the study of Chemistry and all branches of allied science, and the adoption of such measures as may be necessary for the advancement of the Profession, &c." (these being the objects towards the fulfilment of which the efforts of the Institute should always tend), *may* include the expenditure of some portion of the Society's funds upon the occasional publication of matters of special interest to the Profession, and the adoption of any means which appear best calculated to promote good fellowship and concordance of opinion on matters vital to the interests of the Profession ; but it seems obvious that the true functions of the Society, towards the fulfilment of which each Member should willingly contribute, even if only with the comparative narrow view of a substantial return hereafter, are : The establishment of thoroughly efficient examinations in London and the Provinces ; the public promulgation in all directions of the existence of the Institute, and of the position accorded to it by the profession ; and the accumulation of such resources as will allow of all possible steps being taken to promote its public recognition, and as will, in course of time, enable the Institute to secure the permanent and elevated social position which should be

its right as the public representative of the interests of the Chemical Profession.

Among the very earliest of our original Members there are many men of high eminence as manufacturing chemists, and it must be believed that their joining this Institute, with the objects of which they were made thoroughly acquainted, afforded strong testimony of the feeling entertained by the industrial section of the profession that the want existed of a proper guarantee that its younger Members, who entered upon employment in manufacturing, had received the preliminary training essential to their competence, and that the practising Chemists, whose services it might from time to time be necessary to secure, were duly qualified by experience, knowledge, and character, to fulfil the trust which it was necessary to place in their powers and integrity.

These guarantees the Institute now furnishes, and each succeeding year of its existence adds to the importance attained by the qualifications which its Fellowship and Associateship impose and ensure. Each successive year of its existence will see the prime objects of its promoters more firmly established, and more fully developed; and in due course this Association, working steadily, though for a time it may appear but slowly, for the advancement of the welfare, the dignity, and public recognition of the profession, must, if loyally supported, take its place among the important incorporated Professional Institutions of the United Kingdom.

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.



R E P O R T
OF
A C O N F E R E N C E
ON THE
ETHICS OF PROFESSIONAL CHEMISTRY,

Held Wednesday, December 8th, 1881.



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INSTITUTE OF CHEMISTRY.

PAPER

ON CERTAIN POINTS IN THE ETHICS OF
PROFESSIONAL CHEMISTRY,

READ BY

PROFESSOR E. FRANKLAND

AT THE CONFERENCE

Held Wednesday, December 8th, 1881.

IN asking me to introduce the subjects of this Conference as defined by the Conference Committee, I presume your Council considers it desirable that this duty should be undertaken by some one as ignorant as possible of the opinions and practice of chemists in reference to the matters now to be discussed; at all events this is the condition in which I come before you on the present occasion, for my experience in any of the six subjects enumerated has been exceedingly slight, and, such as it was, it occurred long ago, when our profession was very different from what it is in its present developed condition. I have always considered that those persons are best worth listening to who thoroughly understand the subject they talk about, and although there may, on rare occasions, be some advantage in hearing the opinions of so-

called outsiders on account of their presumed impartiality, I think this is more than compensated by the chance of failure in seizing the real points of interest and importance.

Without further preface, however, I will proceed to consider briefly the points to be discussed.

1. *Should chemists take samples for analysis personally?*

It has always appeared to me that, in most cases, the taking of samples for analysis is of at least as much importance, and requires almost as much intelligence, as the performance of the analyses themselves. Commercial articles requiring analysis are rarely homogeneous, and unless due proportions of the heterogeneous parts be mixed, the analysis of the sample must be misleading. With the best intentions as regards fairness, persons ignorant of the requirements of scientific exactness may, and I believe frequently do, take improper samples.

Again, if the article to be examined be a merchantable one, and the seller takes the sample, it can scarcely be expected that he will not select as favourable a specimen as possible; whilst on the other hand, if the buyer samples, an inferior specimen is likely to be sent for analysis.

The analyst ought to consider how easily the character of his profession may be thus imperilled, and he ought, therefore, to guard himself, by every means in his power, against being made the tool of interested parties; and one of the best means of doing this is, in my opinion, to take samples himself, whenever practicable. Of course I am aware that the observance of such a rule is often difficult, or practically impossible, and I am, therefore, far from recommending that chemists should decline to undertake the analysis of any samples they have not themselves collected; but I do desire to express my dissent from the proposition, "That it is *undesirable* that chemists should take samples personally." When, however, both parties to a bargain agree upon a sample, the chemist is relieved of all responsibility in the matter.

2. *Should the conditions of analysis, and the method employed, be stated in the report, where there are different processes in use known to give different results?*

In reporting, the chief object of the analyst ought, I conceive, to be to make known to his employer, and frequently to others as well, the truth about the thing investigated. If, therefore, the conditions under which the analysis was made are such as to require a knowledge of them in order that the analytical numbers may be appraised at their true value, then those conditions ought to be described in the report. Still more ought the method of analysis to be clearly stated if there are several processes in use known to give different results, provided always that the analytical data do not, in themselves, clearly reveal to experts the particular method employed.

3. *Under what circumstances are analysts justified in employing a commercial method prescribed by a client, even when it is known to give inaccurate results?*

In reply to this question, I think it is quite legitimate for an analyst to employ any method prescribed for him—however inaccurate it may be—provided that he gives his client fair warning that the results are not trustworthy, and stipulates that no use shall be made of them unless accompanied by the analyst's statement that he considers them inaccurate. But whilst such work would, under these conditions, be justifiable, the circumstances must be very rare indeed under which a chemist would willingly undertake it. He ought, moreover, to be very careful that there is no sinister intention of making other than a legitimate and straightforward use of his results.

4. *The employment of a way of stating results which is misleading.*

On this point I should not have imagined that there could be two opinions, although it is of course possible that there may be two practices. I can only conceive of the employment of a misleading way of recording results being in some degree justifiable when the recorder is ignorant that his statement is misleading. The statement of all analytical results ought to be as clear and precise as possible and in order that they may be so, the best known methods of analysis ought to be employed, even if they involve much more labour. The cases involving misleading

statements with which I have become acquainted have almost invariably resulted from the employment of imperfect methods by the analyst, followed by his guesses at data which he ought to have ascertained by careful experiment. The losses in these cases have generally fallen upon the client, who thenceforward retains a very undesirable opinion of the capacity of chemists in general.

5. Whether the custom of buying or selling by sample as analysed by some analyst named in the contract should be countenanced?

There may be evils or disadvantages connected with this practice which are unknown to me ; but, so far as my knowledge extends, I cannot discover any tangible objection to it. Moreover, if the proceeding were deemed undesirable, I do not see how it could be effectively discountenanced.

6. The question of reference in cases of discrepancies.

This appears to me to be a very difficult question to answer in a definite manner. In most cases, I should think that the two chemists ought to confer together before recourse is had to a referee, and for this reason I should be inclined to deprecate the appointment of a referee beforehand. It would, in my opinion, be far better that both parties should agree upon an analyst, whose report would then be more likely to be impartial than a result arrived at by the cumbrous and expensive process of employing two analysts and a referee. Moreover, the settlement arrived at by the three would probably never be so satisfactory to either party as the verdict of a trustworthy man employed by both.

THE PRESIDENT: The question having been raised in the Council of the Institute some little time since whether it might not be very useful to have a discussion amongst the Members of the Institute of several points relating to the practices of analytical and consulting chemists, in the pursuit of their profession, a committee was appointed to consider what subjects might be practically dealt with in this way. The Committee framed six questions which appeared to afford scope for very useful discussion, and to include a variety of topics of general interest to the pro-

fession. The difficulty, however, was to determine how best to open a discussion on these subjects, and we naturally sought among our members one who, occupying an independent position, would be likely to bring before us the questions without bias, and to lead us to discuss them from various points of view. We thought our choice could not fall upon a better man than Dr. Frankland, and he kindly consented to deal with the subject. No doubt all of us have perused his Paper carefully, and what I would suggest to you is, that we should not now at once deal with the whole Paper, short as it is, but that we should take up seriatim the questions, with what Dr. Frankland has got to say upon each one, and discuss them in this way, so as to arrive in as brief a period as possible at some conclusions.

THE SECRETARY then read the first question, with Dr. Frankland's remarks thereupon.

THE PRESIDENT having invited discussion,

DR. VOELCKER said : Dr. Frankland thinks that if the seller takes the sample it can scarcely be expected but that he will select as favourable a specimen as possible ; while a similar remark will apply in the case of the buyer. What I would ask is this : If two parties, one for the buyer and one for the seller, watch each other, is it not likely we shall obtain a fair sample ? It is quite true that if we have to deal with a new commercial article of which we know but little, a chemist might be of some assistance in devising a proper plan of sampling ; but in a recognised article of commerce a man accustomed to sampling might be up to the tricks of trade, and so sample better than a qualified chemist. On the whole, I am inclined to think that sampling might be left to those who are interested in the matter, and for whose interests the sampling is made, and the responsibility of the chemist should terminate in turning out accurate results. He should confine his attention to making the analysis, and should not undertake a special duty which he could not personally perform, but would have to leave to his assistant, with the probability that this assistant would not be so well up, in my opinion, as a man trained to taking samples.

PROFESSOR REDWOOD said: I have not much to offer upon this subject. I agree generally with the remarks of Dr. Voelcker, and in addition would say that, in my opinion, there are two perfectly distinct classes of samples which chemists are called upon to analyse. These two classes call for distinct and different modes of collecting. In regard to commercial samples, I think what has been said by Dr. Voelcker directly applies, and that we are accustomed to look for the collection of such samples by persons interested both in behalf of the seller and buyer, and these persons, as far as my experience goes, are accustomed to take fair and proper samples: the responsibility that rests on the analyst is to make a correct return of the real value of such samples. There are, however, many other cases where it devolves upon the analyst to take samples personally: this applies, for instance, to samples of water, where the fitness of such water for drinking purposes is in question. There are circumstances connected with the natural history of the water, its source, and the surroundings of this source, of which no person can form an adequate opinion so well as the analyst who is called upon to express an opinion on its salubrity. It appears to me, therefore, that under those two different classes of circumstances, the mode of proceeding should be distinct and different.

MR. DAVID HOWARD: I do not know that I can say much on the subject, excepting so far as my own experience is concerned. That experience is confined to well-known customs of trade, and may throw a certain amount of light upon this subject. There are two quite distinct points, as Professor Redwood has said. In certain cases a chemist is more of a consulting chemist than a referee; and in such cases, if he can bring his skill to bear in taking a sample, it is desirable he should do so. The majority of commercial samples, however, are of two classes—those which are sampled by an independent person, and those sampled by the buyer and seller together, or by the seller only. A very large class of goods which come into the London produce market—known as “The Lane”—are sampled in the dock or wharf. It requires

years of experience, and very great skill and care, to sample properly; so much so, that I invariably take, if possible, a sample by a skilled man. It is exceedingly tempting in sampling—especially if it is something you think you know a good deal about—to take a sample which strikes your eye. For this reason, I rarely take samples with my own hands. As a matter of fairness it is not desirable that a sample should be drawn by any one skilled in the special goods, so much as by one skilled in the art of sampling. If it were known that the sampling at any wharf or dock was not well performed, there would be a great objection to buy goods from that wharf or dock. In these cases it is most undesirable that a chemist should interfere, for he would certainly not do the work as well as a man receiving wages not quite representative of the value of a chemist's time. In the case of a seller's samples, it is most undesirable that a chemist should have any responsibility: if the samples of buyer and seller do not agree, he cannot be blamed; but if he had drawn the samples himself, the responsibility would be thrown on his hands. The ordinary custom where samples are not drawn at the wharf or dock is, that the buyer and seller, or their representatives, should agree to sample together. The analyst is thus perfectly free from responsibility, and if a mistake is made, it is not his. Of course I am now speaking of the class of articles with which I am acquainted. If I am to analyse a sample, I would prefer it drawn by a man who has the specific knowledge of sampling, because I believe he will do it mechanically, and therefore better.

MR. MAXWELL LYTE: I think that sampling is as much a business to be learnt by a chemist as any other branch of his profession. He ought, at all events, to know how to sample. He ought not to be considered to be obliged to trust to a man in the docks to collect his samples. A chemist ought always to assist if he can, and if not, he should, if possible, employ some qualified agent to assist. It should not be a recognised thing that a chemist does not know how to sample. In the next place, I would say that the responsibility of the chemist may be too limited. In

France this responsibility is very much greater than it is here. A chemist who makes an assay of gold or silver has the responsibility of that assay thrown upon him, and is legally liable both to the vendor and the purchaser—within the limits of allowable error—if any loss accrue from his assay; and although it might happen he was not proceeded against, still the responsibility is legally his, and he could be sued in a court of law. If there was more responsibility here attached to the chemist, I believe it would tend to raise the standard of the profession, and his condition would be considerably improved.

DR. PAUL: In addition to the remarks of previous speakers, with most of which I agree, I might say there are, no doubt, cases in which the identification of the samples by a chemist becomes a matter of importance—in poisoning cases, for instance; or in cases of nuisance, and where it is necessary to give evidence in relation to sanitary matters, but in ordinary trade affairs the only point to be considered by the chemist is that his analysis should be accurate, and the statement of his results precise. When a sample is put into his hands, it is of very little importance to him whether it represents the bulk of the article or not; so long as his work is properly done, he is free from all responsibility on that score. The most satisfactory conditions under which samples are taken is where the buyer and seller agree upon the sample to be analysed; and if in that case the bulk does not agree with the sample, it is the samplers who are to blame. An objection is put forward by Dr. Frankland that when a sample is supplied to the chemist by the seller, the latter is likely to take a favourable sample. I do not think that is tenable. A man who has to offer a material for sale on the basis of an analysis would naturally desire as correct a certificate as he could get. If he has sold according to sample, and certified goods as being of a certain value, he lays himself open to an action for damages, or to make good the difference in value, if the goods turn out to be inferior. A person buying, on the other hand, would take care to have as correct a sample as possible. I believe what is considered the most satisfactory plan is for buyer and seller to have

their respective representatives—generally, the better class of workmen, earning, say, £2 a week, and perfectly able to draw a satisfactory sample; in this way everything that the chemist requires is supplied. Another objection to the chemist interfering with sampling is that it is quite impossible for him to give the time required for this work. It is sometimes necessary to go a distance—to Liverpool or Cornwall—and it would interfere greatly with his professional work if he were compelled to do this, besides involving him in responsibility that does not properly appertain to him as a professional man.

MR. TYRER: I think the whole question of sampling is pretty well indicated in the concluding sentence of the third paragraph:—"When, however, both parties to a bargain agree upon a sample, the chemist is relieved of all responsibility in the matter." One cannot help thinking there may be circumstances in which the chemist may very naturally be called in to decide where "doctors differ," particularly when a sample has been drawn from a part of the material different from that whence another sample has been taken. With regard to sampling at the docks, having had some slight experience in the matter, I am bound to say I must heartily agree with Mr. Howard as to the mechanical accuracy—may I call it?—of these samples. The chemist has not the technical knowledge necessary to do the work properly, and I have found that in comparing the samples which the men have taken with those taken on my own independent judgment, that in almost every instance my sample was not so fair as that taken by the purely mechanical man. Of course, if the chemist had the time to do the work himself, he would derive benefit from a wider acquaintance with raw products, of which he does not know, perhaps, so much as he ought; but if a man of extensive practice be called upon to analyse a substance, and gives the result, I do not see how he can be asked to undertake sampling, which, after all, is rather a mechanical matter than a scientific one.

MR. JAMES BELL: In the Somerset House Laboratory we never, except under very exceptional circumstances, draw samples for

analysis ourselves. We take this course to avoid being placed in a false position should complaints arise of unfairness in the taking of the samples. Such complaints, according to our experience, do occasionally occur, and, when second samples are taken, acknowledged to be fairly drawn, the results of the analysis sometimes differ materially from those obtained from the samples first taken. Not having been concerned in the taking of either of the samples in such cases, we can with every confidence report the analytical results in both cases, whether they agree or not, without fear of being charged by either side with bias or prejudice.

No analyst could expect to be always successful in drawing fair, average samples, and if he were compelled to convict himself in an error in the performance of one duty, it is clear that this would be likely to create a doubt in the minds of those employing him as to the accuracy of his analysis.

The samples submitted to us for analysis are taken by persons entirely outside our control, and, consequently, in undertaking the analysis our minds are wholly unbiassed, and free from doubts and fears as to the unfairness or otherwise of the sample, and we find this system to work so well that I should recommend all analysts, whenever practicable, to follow the same course. So thoroughly are we convinced of the advantages of this system, that when requested to draw our own samples we almost invariably decline, and even in any exceptional case, where we may deem it necessary or advisable for us to do so, we are careful to have the analysis made by a different analyst to the one who took the sample.

MR. C. T. KINGZETT: Apart from the desirability or undesirability of samples being taken personally by analysts, I should like to ask some of the Fellows whose opinions we have heard, what there is in this perfection of mechanical skill attained by unprofessional persons that defies chemical science. To ensure fair samples, it is only requisite to take fair quantities of any number of materials which may be placed before one, and I altogether fail to see why chemists, trained as they are in the matter of quantities and technical knowledge, should not carry out such

operations more satisfactorily than untrained and scientifically-ignorant persons. I should certainly prefer my own samples to those taken by a wharfinger, or other similar person.

For certain classes of work, such as the analysis of, say, asphalt pavements laid under contracts, it is extremely desirable that the samples should be taken by the professional chemist employed, although, doubtless, for many purposes such a precaution is not necessary.

MR. NORMAN TATE: I came here rather to listen than to speak, but being largely engaged in the examination of commercial products, I may say that my own impression is, after some years of experience, that sampling and analysis form two different classes of work. Yet I cannot but think that a chemist should be familiar with every mode of sampling, in order that he may judge whether his sample fairly represents what it is said to represent. Mr. Kingzett asks what makes sampling so difficult. I can only say I should be very sorry to trust a chemist unaccustomed to sampling to take a sample. I will mention a case in point: There was a dispute in relation to the strength of some caustic soda-ash, and it was referred to a chemist to sample and analyse, but he simply scraped off a portion of the upper surface of the contents of one of the casks, put it in a bottle, and analysed this sample, and the result was, of course, totally wrong.

I think it is necessary that a chemist should be accustomed to sampling work, because if the buyer and seller, or their representatives, both take samples, it is often a matter of dispute as to how much "good" or "bad" shall be put in. This is constantly taking place. It really comes to this, that the man who samples must be a man who is daily engaged in sampling, and who knows the sort of goods he has to sample. Very much depends upon technicalities. For example, in the case of palm-oil, certain modes of procedure are prescribed by the trade. A "tryer" is run from the bung-hole to the bottom, and what comes out is considered a fair sample of the contents of the cask. But this oil differs according to weather and other circumstances, and a different sample may be taken in cold to that taken in warm weather. Then there

is generally a certain amount of dirt, and the position of this differs according to the position in which the cask was packed. A knowledge of all these technicalities is necessary, and shows that an experienced man would do better work than a chemist unaccustomed to sampling.

MR. F. A. MANNING said: I quite agree with Mr. Howard that the best sampling is that which is the most purely mechanical. In order to secure this, I would have examples taken from portions not exposed to view.

In the only branch of sampling in which I have had any experience (the coal-tar products) there is a considerable difference now as to the limits of error allowed. A few years ago manufacturers and buyers were contented if they found samples to be within one or two units of the truth. Now they require practically that they should be within half an unit. I attribute the increased exactness obtained in a great measure to the care exercised in drawing and preparing the samples.

DR. STEVENSON: I think that in such cases as poisoning it is important that the chemist should take the samples himself, but commonly they are taken before he hears of the case. To take samples would involve generally such an expense that few persons could afford it. Of course, in occasional cases, people may call in chemists, but these cases must be very few in number, and would have little effect on the general principle of sampling.

DR. FRANKLAND, in reply, said: In the first place I must express my thanks to the several gentlemen who have favoured us with their views on this subject, and for the valuable information I have gained from them. Their remarks have confirmed my opinion as to my incompetence to deal with this subject. I entirely agree with the observations which fell from Mr. Howard. Wherever the chemist can bring his skill to bear in the collection of samples, he ought, if circumstances permit, to exercise it; for the chemist certainly ought to be better capable of taking fairer samples than a wharfinger, however well the latter may have been trained. I also agree with the opinion advanced by Mr. Maxwell Lyte, that it would be better if chemists were not

treated so much as a mere machine in these matters. Still, I think there are many cases in which they ought not to be taken from their work in order to draw samples of ordinary materials. No doubt it is a difficult question, but I contend that in cases where intelligence is necessary in sampling, it ought to be exercised by the chemist, and that he should, as a rule, take the samples himself.

THE PRESIDENT: I think there appears to be a general consensus of opinion in regard to this question of sampling. Where the work is mechanical, we all agree that such mechanical work requires great experience and a certain amount of skill, neither of which may be possessed by the chemist, or can be acquired, only by long practice. But there are certain questions in which the chemist may usefully exercise *his* skill and experience—certain special subjects in which it devolves upon him to take samples for himself—such, for instance, as the examination of a water in respect to its wholesomeness—certain questions in which something more than mere intelligence must be exercised in determining how the sample is to be taken, and in examining into conditions, circumstances, and surroundings in connection with its collection. It is very satisfactory that the conclusion we have come to is an unanimous one, and that during the discussion most of us have gained some information which cannot fail to be useful to us. Unfortunately Dr. Frankland has not much more of his valuable time to spare this evening, and I am doubtful how far we can encroach upon it by taking up the next question for discussion. There is, however, no reason why we should take the questions *seriatim*, and I think it would be convenient if we were to select one which not only bears somewhat upon the question we have just been discussing, but the consideration of which is, moreover, not likely to occupy much time. I would suggest, therefore, that question No. 5 be taken.

THE SECRETARY having read No. 5,

MR DAVID HOWARD said: I must say that, so far as my experience goes, I fully agree with Dr. Frankland. I do not see how the practice of nominating chemists can be discountenanced.

As a matter of practice the
 does not know, even when
 course if two parties agree

an analyst is not asked his leave, and he
 the sample comes before him. Of
 upon an analyst it saves all further
 question, and it is impossible to raise any dispute, and all
 vexatious questions of "high" and "low" analysts are set at rest.

No doubt the system of naming an analyst throws a good deal
 work into the hands of those who have gained a public reputation;
 but this cannot be avoided. It is a very common thing to put
 down three or four well known names, and to select one. If a
 buyer and seller agree to be bound by some one analyst, it
 certainly has immense commercial advantages. It avoids a
 difficult question, the question of referees in case of discrepancy.

MR. TYRER: Nothing can be more invidious than the position
 of chemists referred to by Mr. Howard, and reputed as "high"
 or "low," and chosen by seller or buyer to be pitted against one
 another. There is no benefit from this competition, either to the
 chemist or to the profession. The naming of a particular chemist
 certainly has its advantages, and I hope this Institute will not
 forbid its members undertaking engagements of this kind. In
 my own experience, where questions have been referred to A. and
 B., and to C., in the event of A. and B. differing, there has been a
 great amount of anxiety. From a commercial point of view, the
 system of naming an analyst of repute disposes of these difficulties.

DR. VOELCKER: I fully recognise the difficulty of the case,
 whether you take one side or the other; but it appears to me
 undesirable to name two chemists unless you also name a referee.
 No doubt to prevent all disputes the best way is for both parties
 to choose one chemist. If you choose two chemists, you get
 "high" and "low" chemists, and that is the result of naming,
 and one of its drawbacks. If a buyer or seller wishes for
 what is called a "high" chemist, you might give him the
 name of a chemist whose analysis one could tell to a half per cent.
 how he would bring it out. If a seller selects a "high" chemist,
 then the buyer must take a "low" one; and the consequence of this
 is that a great deal of the work is left in the hands of buyers'
 and sellers' chemists. In the case of a dispute referred to a

referee, the probability is that the decision of the latter is not taken as it is, but the mean of his result and that with which it agrees most closely is taken. As I said before, when two chemists are named you are almost bound to name a referee.

MR. NORMAN TATE: The question is this—Do we wish to see the practice of buying and selling on samples, as analysed by a chemist, discountenanced? My opinion is, that whether we discountenance the practice or not, sales will continue to be made on the basis of tests. Therefore, if samples are to be analysed, it is better the work should be done by a chemist than by an inexperienced person; and far better it should be relegated to one chemist only than be placed in the hands of two chemists chosen respectively by the buyer and seller, because we do find differences in results, according as the chemist has to decide for the buyer or seller. In the case where one chemist is employed it is not so much a case of buyer or seller as deciding what is fair for both parties.

MR. MAXWELL LYTE: I should submit that this matter is one of commercial convenience, and that it is of course natural, in order to avoid subsequent bickerings, in cases of difference, that buyer and seller should agree beforehand to give their work to some particular chemist. It is natural, also, that under these circumstances, when certain products have to be analysed, the work should be given to particular chemists who are accustomed to the analysis of these particular products—super-phosphates, or copper, for instance.

DR. FRANKLAND, in reply, said: I do not think I have any observations of importance to make in connection with the discussions. On this question, there seems to be a very general unanimity of opinion which coincides with the brief expressions I gave in the introduction. It has occurred to me that probably there is a feeling among the younger members of the profession that the older are usually selected for this kind of work, and I would suggest whether it is not possible for this Institute to do something by which young chemists could be brought forward. The idea of course is wholly a crude one, but if men laid themselves out for special kinds

of work, might there not be a register kept, so that their names could be placed before merchants and manufacturers? No doubt, as Mr. Lyte has said, there are chemists of special attainments better fitted for some kinds of work than are others who have not so qualified themselves. It is possible that something of the kind I have suggested might be adopted, and might lead to a better diffusion of this work among the profession, especially among the younger members.

THE PRESIDENT: I agree with Dr. Frankland so far as to consider that it would be very desirable to prepare the mercantile mind for the employment of younger chemists who are well qualified by knowledge and skill for particular classes of work. Dr. Voelcker has held out a strong temptation to rising professionals to become "high" chemists, but to counterbalance the "high" chemists there ought, of course, to be a few "low" ones (laughter). On the whole, however, it appears that the practice to which this question relates, is one which may very well be left as it is. In conclusion the President said, that as there were four more questions to be discussed, and as it would be a pity to deal with them hurriedly, he would suggest that the further discussion be adjourned until a future meeting, which the Council would fix as speedily as possible.

This was agreed to, and the meeting adjourned.

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.
—*—
THE REPORT OF THE COUNCIL
AND
BALANCE SHEET FOR 1882,
TOGETHER WITH THE
ADDRESS OF THE RETIRING PRESIDENT,
PROFESSOR ABEL, C.B., F.R.S., &c.

London :
PRINTED BY A. P. BLUNDELL & CO., 26, GARLICK HILL, E.C.
—
1883.

LIST OF OFFICERS & COUNCIL FOR 1883.

PRESIDENT.

W. ODLING, M.A., M.B., F.R.S., &c.

VICE-PRESIDENTS.

A. CRUM BROWN, M.D., F.R.S., &c.

M. CARTEIGHE, F.C.S.

C. GRAHAM, D.Sc., F.C.S.

DAVID HOWARD, F.C.S.

J. EMERSON REYNOLDS, M.D., F.R.S., &c.

R. ANGUS SMITH, Ph.D., F.R.S., &c.

TREASURER.

C. R. ALDER WRIGHT, D.Sc., F.R.S.

ORDINARY MEMBERS OF COUNCIL.

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A. H. ALLEN, F.C.S.

R. BANNISTER, F.C.S.

JAMES BELL, F.C.S.

G. E. DAVIS, F.C.S.

W. F. DONKIN, M.A., F.C.S.

A. DUPRE, Ph.D., F.R.S., &c.

E. FRANKLAND, Ph.D., D.C.L., F.R.S.

W. N. HARTLEY, F.R.S.E., F.C.S.

C. HEISCH, F.C.S.

D. B. HEWITT, M.D.

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E. W. T. JONES, F.C.S.

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W. A. TILDEN, D.Sc., F.R.S., &c.

T. TYRER, F.C.S.

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T. WAY, F.C.S.

SECRETARY.

C. E. GROVES, F.C.S.

INSTITUTE OF CHEMISTRY

OF

GREAT BRITAIN AND IRELAND.

REPORT OF COUNCIL.

At the time of the last Annual General Meeting, there were on the Register 412 Fellows and 47 Associates, whilst at the present time there are 396 Fellows and 37 Associates, besides three Fellows who have been recently elected, but not yet formally admitted, making 436 Members in all. During the past year we have lost seven Members by death: Mr. Dugald Campbell, Mr. T. A. Collinge, Mr. B. J. Grosjean, Mr. Sydney Jutsum, Mr. T. W. Keates, chemist to the Metropolitan Board of Works, Professor Marreco of Newcastle, and Dr. G. A. Pearce; whilst six Associates have become Fellows.

During the year a Conference has been held, at which the discussion of "Certain Points in the Ethics of Professional Chemistry" was continued, the subject having been introduced at a previous meeting by Dr. Frankland. Besides this Con-

ference, two Lectures have been given; that by Mr. R. Warington, "On Modern Methods of Gas Analysis, and the Apparatus employed therein," was the first of the series of experimental demonstrations in connection with Methods of Analysis mentioned in last year's Report. This has been followed by a Lecture "On Polarimeters and their Practical Application," by Mr. C. O'Sullivan, for the illustration of which important assistance was obligingly furnished by the President of the Royal Society. The Council are making arrangements for the delivery of other Lectures during the ensuing Session, which will be duly announced when the preliminaries are definitely settled.

In October, a Meeting of the Fellows and Associates took place at Birmingham and was largely attended. During their visit, the Members were enabled to inspect some of the most important works in the neighbourhood, more especially the Alkali Works and Glass Works of Messrs. Chance Brothers, Earl Dudley's Iron Works at Round Oak, and the Corporation Gas Works, to the owners and managers of which the Council take this opportunity of returning thanks. The proceedings terminated by the Members dining together at the Great Western Hotel in the evening.

The Council has most carefully considered the present financial state of the Institute and its future prospects, with a view of ascertaining if it would be conducive to the interests of the Society to make some alteration in the amount which Members contribute, either by substituting a diminished composition fee for the annual subscription, or by reducing the annual subscription. They find, however, that the former is quite impracticable, as the capital sum which would be secured, even if every Fellow were to pay the composition fee of twenty-five guineas fixed by the existing Articles of Association, would not yield an adequate income. On the other hand, although an income just sufficient

to cover the necessary expenses would be raised if the subscription of Fellows were to be reduced from two guineas to one guinea per annum, yet if there were any important diminution in the number of Fellows or increase in the expenditure, there would be a deficit every year, which would have to be met, either by voluntary subscription, or by drawing on the invested capital. Seeing that it is of primary importance that an Association of the character of the Institute of Chemistry should have the command of funds available for purposes tending to advance the general position and interests of the profession, such as incorporation by private Act of Parliament,—a measure which it is to be hoped may be carried into effect before long,—the Council deem it inadvisable that any change should be made at the present time in the contributions of Fellows and Associates to the funds of the Society.

As applications for admission to the Institute have been made by several Chemists residing permanently abroad, and for whom it is impossible to attend the prescribed practical examinations held in England, special arrangements have been made whereby these candidates can be examined in practical Chemistry without coming to England for that purpose.

The Council have made arrangements for the appointment of Local Examiners in several of the more important centres in the provinces, through whose exertions and influence it is hoped that a knowledge of the aims and objects of the Institute may be more widely disseminated, especially with regard to the steps to be taken to promote the systematic training which is becoming more and more necessary for students who are desirous of adopting Chemistry as a Profession.

The prize of £25 which Dr. C. Meymott Tidy has offered for the best original investigation on "Special Reactions of the Alkaloids, and their separation from Organic Mixtures," has not yet been

awarded. This prize is open, not only to Associates, but to all persons, except Fellows of the Institute, who shall before the 31st December next, have qualified themselves for the Associateship in all respects, short of passing the prescribed practical examination ; and the Council has decided to accept successful competition for this prize in place of such practical examination.

The Institute is indebted to the President and Council of the Chemical Society for the use of their rooms during the past year.

INSTITUTE OF CHEMISTRY OF GREAT BRITAIN AND IRELAND.

STATEMENT OF ACCOUNT AND BALANCE SHEET,

FROM 1ST JANUARY TO 31ST DECEMBER, 1882.

	£	s.	d.	£	s.	d.
Balance in hand, 1 Jan., 1882	..	..	..	549	19	0
7 Entrance Fees at Five Guineas ..	..	96	15	0		
1 Life Composition ..	..	26	5	0		
358 Fellows' Subscriptions ..	..	751	16	0		
39 Associates' ..	..	40	19	0		
Interest on Consols ..	..	..	..	792	15	0
Examination Fees ..	..	..	..	80	15	8
				15	15	0
				£1,493	4	8
Printing, Stationery and Postage ..	..	..	..
Advertisements ..	..	..	..
Rent, Office, and Miscellaneous Expenses ..	..	..	..
Examiner's Fees ..	..	..	..	68	0	0
Honorarium to Lecturer ..	..	..	..
Salaries and Wages ..	..	..	..
Parliamentary Agents ..	..	..	..
Purchase of £500 3 % Consols ..	..	..	..	792	15	0
Balance in London and Westminster Bank, 31 Dec., 1882 ..	..	..	..	80	15	8
				15	15	0
				£1,493	4	8

Assets.

31 December, 1882, Cash in hand	..	..	475	5	5
" " £3,000 3 % Consols.					

Audited and found correct,

Jan. 9th, 1883.

Liabilities.

31st December, 1882	None.
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GEORGE H. MAKINS.

W. KELLNER.

PRESIDENT'S ADDRESS.

IN venturing to offer a few observations supplementary to the Council's Report, on this the last occasion of my occupying the Presidential chair, I regret that I cannot hope to bring before you any matters of very special interest, or subjects for special congratulation as tending to demonstrate very important progress made during the past year in the advancement of the chief objects of our Association. Yet I venture to think that, even though our ranks have been a little thinned by some very sad losses by death, including several highly respected members of the profession, and a few retirements of gentlemen whom we may confidently hope to see among us again in times to come, we have good reason to be satisfied with the improvement in our position, and the substantial progress in the development of our sphere of usefulness, which have been made during the last twelve months.

Although we do not desire, nor hope, to secure the continuance of a substantial income *simply* for the sake of accumulating property as an Association, your successive Councils have striven (even while incurring something more than risk of unfavourable criticism) to limit the annual expenditure to the minimum necessary for carrying out those objects of the Society which are most readily attainable, in order to acquire as speedily as possible the financial resources indispensable to the attainment of such legal status as will give the profession, through its Institute, the publicly recognised position among other scientific and learned professions which is its due. Being fully alive to the duty, as well as the prudence of meeting, if possible, the very human desire of a section of Fellows of the Society, for some immediate return or promptly rendered substantial equivalent for the annual contribution to the Funds of the Institute, your Councils have

striven to furnish this, at any rate to some small extent, without incurring an amount of expenditure which would be suicidal to the ulterior objects of the Association ; and the success which has attended the experiment of establishing a system of experimental demonstrations or lectures, of special character, has shown that these strivings have not been altogether fruitless.

The proposal to issue some form of periodical publication for the information of the Fellows was most anxiously considered by the Council, and it was only rejected because it was clearly manifest that it was impossible to produce a publication which should be really useful to the Members, and which should not bring discredit upon the Institute, without expending by far the largest proportion of its income. The prudence and firmness of your Councils in this matter have, I submit, entitled them to the gratitude of the profession, if only for the *one* reason that they have at any rate given strength, if they did not actually give rise, to the movement which has resulted in the creation of what bids fair to be one of the most important, as it is already one of the most numerous, technical Associations in the country, and in the establishment of a periodical which, if it does not in all respects come up to the ideal of what a *professional* journal of the Institute of Chemistry, or a journal of reference for practising Chemists, should be, is certainly already little less valuable to the professional than it is to the technical Chemist, and may in course of time meet many existing requirements of the former. To all those Fellows of the Institute who do not also belong to the Society of Chemical Industry, this journal will speedily be supplied, and thus the desire of the Fellows in this direction will, it is hoped, have been in some measure fulfilled without any very serious demand upon the Society's resources, at any rate until such time as those resources, after the accomplishment of work to be presently mentioned, shall warrant our undertaking the production of such a journal as would be a valuable contribution to our periodical Chemical literature, and of special use to practising Chemists.

The Institute includes among its Fellows a number of Members who joined the movement for its establishment purely in the interests of the Chemical profession generally, and with no thought of deriving either material or social benefit therefrom ; and some few of these have recently quitted the Institute, either because they believe that the object for which they gave their adherence to the proposal for its establishment cannot be further promoted through their instrumentality, or because their views regarding the position which the Institute should fill have not been realised with the expedition which those might expect who are unacquainted with the difficulties to be surmounted. To the latter cause, combined with a hesitation to continue an annual contribution of two guineas without receiving an equivalent in money value, must also probably be ascribed the secession from the Society of a few Fellows to whom, in course of time, the title and position of Fellow of the Institute might become of substantial advantage. That an undercurrent of discontent, at any rate, has arisen from these causes there appears no doubt, and the Council have been in cordial sympathy with those Fellows of the Institute who have strong feelings on the subject of the nature and amount of contribution, which, according to existing arrangements, they are called upon to make to the Funds of the Society.

The Council's Report has informed the Society of the results of their deliberations on the subject of a possible reduction of the annual subscriptions or alteration in the nature of payment to be made by Fellows and Associates. Although it has been possible to accumulate a reserve Fund of £3,000 during the first five years of our existence, while, moreover, the Council now to be elected will at once be able, as the Balance Sheet indicates, to add substantially to that Fund, the financial condition of the Institute does not yet allow of the introduction of the reform in the nature of contributions to be made by Fellows and Associates which the Council wished to have been able to recommend, namely, the

completion, once for all, of payments, by those admitted to the Institute, upon their attaining the position of Fellow, and the payment by existing Fellows of a moderate composition in lieu of the future annual payment of subscriptions. It is hoped that the present financial condition of the Institute is such as to warrant the next Council in taking steps with as little delay as possible for securing the incorporation of the Institute by an Act of Parliament; but the considerable outlay which this must entail unavoidably delays the possibility of introducing any radical alteration in the nature and amount of contributions paid by Members; a delay which the proposed course of action will doubtless justify to all who desire that the Institute of Chemistry, as representing the Chemical profession, should in time occupy a public and official position as thoroughly recognised and secured as those of the representative Corporations of other learned professions.

Your President and Council have been watchful of opportunities to bring the Institute and its representative character to the notice of State Officials or Public Bodies. In illustration of this I may refer to the circumstance that, when the Secretary of State for the Home Department announced in the House of Commons last March that he had called upon the Presidents of the Royal College of Surgeons and Royal College of Physicians to suggest experts duly qualified to act as Government Referees in cases of suspected poisoning, the Council authorised me to address the Home Secretary, directing his attention to the existence and nature of the Institute, and submitting that, as the Referees to be appointed must be Chemists having special attainments and experience, the President of this representative Association of professional Chemists ought at least to be associated with the Presidents of the two medical bodies in this matter. It was obvious that the Official arrangements had already been completed, so as not to be susceptible of modification, when their nature was announced in Parliament, and the communication to

the Home Secretary simply received a formal acknowledgment ; but while the Members of the Institute cannot be otherwise than thoroughly satisfied with the choice, which in the present instance was made, by the Presidents of the Medical Corporations, of two eminent Members of our Body, it will, no doubt, be considered important by those who will in future direct the affairs of the Society, to take prompt and proper measures for asserting its claims to being officially consulted in this matter, and in other cases where consultation is resorted to in reference to questions which directly concern the chemical profession.

The Members will be glad to learn that the advice of the Institute *was* sought by the Home Secretary in another matter, namely, in reference to the amendment of the law relating to the sale of poisons ; and, in compliance with the request for a report as to any suggestions which the Institute might offer, several recommendations were submitted, these being the result of a careful consideration of the subject by a special Committee.

In one matter of primary importance connected with the objects of the Institute, your Council has not been idle during the past year. With the view to encourage young men who are preparing for the chemical profession, or some kindred vocation, to submit themselves to the tests of general training and chemical knowledge afforded by our examinations, and, with a view to accelerate the general recognition throughout the kingdom of the grade of Associate as a guarantee of qualification, it has been decided that candidates who are studying or employed in or near any of the most important provincial centres, may avoid the cost and loss of time entailed by presenting themselves for examination in London, their attainments being attested by a Local Examiner, at the centre most convenient to them. In asking Fellows of the Institute to undertake the office of Local Examiner, the Council desire, at the same time, to secure an Official Referee at the par-

ticular locality where he consents to act, from whom information regarding the Institute, the terms and conditions of admission, &c., may be obtained on the spot, and who may also inform or assist the Council in respect to any matters of local nature which may have to be dealt with by the Institute. It will be acknowledged that by securing the assistance of Professor Mills, in Glasgow, Professor Hartley, in Dublin, and Professor Tilden, in Birmingham, as Local Examiners and Referees, the Council made a very good beginning in carrying out this arrangement, as it would be impossible to select from among our Fellows any who have the interests of the Institute more warmly at heart than these three eminent chemists. The Council's first success in this direction has already been followed up by the acceptance of the posts of Examiners in Bristol and in Manchester by Dr. Ramsay and Mr. Watson Smith, and we may, therefore, regard this subject of your late Council's efforts as in course of very successful development.

Much useful work, in the consideration of important subjects affecting the affairs of the Institute and the interests of the profession, has been done by Committees appointed by the Council ; work not the less important because it is not of a nature to produce results which can be dealt with in the Report of the Council ; but I may just refer, in illustration of it, to the labours of a Committee on Professional Charges, which will resume important deliberations after the appointment of the new Council, and will probably be so modified in character as to enable it to advise the Council on some subjects intimately connected with, and vitally affecting, the public status of the practising Chemist, and on very delicate questions relating to the maintenance of proper professional etiquette and dignity, which lies at the root of our position, prosperity and power, as a profession.

The vital importance, to these, of harmony and good fellowship among all Branches of the Profession has been strongly felt by

your President and Council, and the beneficial effects of occasional social intercourse of Fellow Professionals residing in different parts of the kingdom, which it has been their endeavour to promote, have been well illustrated by the good fellowship among ourselves, and between us and our Sister Societies, which was displayed at the gathering at Sydenham last March, for accomplishing which Dr. Roscoe and I were rewarded by the heartiest recognition of our labour of love from all three Societies,—and at our smaller, but certainly not less successful autumn meeting at Birmingham, which was made so interesting to us through the kindness of Members of the Society of Chemical Industry.

In concluding these few observations, with which I quit this Chair, let me first thank the successive Councils with whom I have laboured, for the invaluable support and aid which one and all have afforded me, and let me thank the Members of the Institute generally for the indulgence with which they have received the efforts on my part to advance its interests and promote the attainment of its objects. Although the results of those efforts may be small, let me at least hope that they may have contributed to the secure foundation of a permanent Association, whose benefits to the Chemical profession and to the Public will rapidly develop and speedily receive general recognition.

Lastly, let me give expression to my confident belief that the exertions of those to whom you have hitherto entrusted the direction and the interests of the Society have paved the way for more important work than it has been in their power to accomplish, but which will be successfully grappled with by their successors, and that the appointment of your new Council and, as President, of one of the brightest ornaments of the Profession, whose brilliant talents and eloquence are equalled by his sagacity, will mark a new departure in the usefulness and prosperity of the Institute of Chemistry.

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

THE REPORT OF THE COUNCIL

AND

BALANCE SHEET FOR 1883,

TOGETHER WITH THE

ADDRESS OF THE PRESIDENT,

DR. ODLING, M.A., M.B., F.R.S., &c.

London:

PRINTED BY A. P. BLUNDELL & Co., 26, GARLICK HILL, CANNON STREET, E.C.

1884.

LIST OF OFFICERS & COUNCIL FOR 1884.

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W. ODLING, M.A., M.B., F.R.S., &c.

VICE-PRESIDENTS.

SIR FREDERICK ABEL, C.B., F.R.S., &c.

C. A. CAMERON, M.D.

J. FERGUSON, M.A., F.C.S.

E. FRANKLAND, Ph.D., D.C.L., F.R.S., &c.

A. VOELCKER, Ph.D., F.R.S., &c.

WALTER WELDON, F.R.S., &c.

TREASURER.

C. R. ALDER WRIGHT, D.Sc., F.R.S., &c.

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A. DUPRE, Ph.D., F.R.S., &c.

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C. HEISCH, F.C.S.

D. B. HEWITT, M.D.

ALFRED HILL, M.D., F.C.S.

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J. MACTEAR, F.C.S.

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F. J. M. PAGE, B.Sc., F.C.S.

E. RILEY, F.C.S.

W. C. ROBERTS, F.R.S., &c.

R. ANGUS SMITH, Ph.D., F.R.S., &c.

J. MILLAR THOMSON, F.C.S.

W. THORP, B.Sc., F.C.S.

C. MEYMOTT TIDY, M.B., F.C.S.

T. TYRER, F.C.S.

R. WARINGTON, F.C.S.

SECRETARY.

C. E. GROVES, F.R.S., &c.

INSTITUTE OF CHEMISTRY

OF

GREAT BRITAIN AND IRELAND.

REPORT OF COUNCIL.

At the last Annual General Meeting there were 396 Fellows and 37 Associates on the Register, whilst at the present time there are 398 Fellows and 38 Associates, besides three Fellows and one Associate recently elected but not yet formally admitted, making 440 Members in all. Three Associates have become Fellows. During the past year the Institute has lost four Fellows by death: Mr. G. M. Hopwood, Sir William Siemens, F.R.S., Prof. J. T. Way, and Dr. James Young, F.R.S., of Kelly.

On reference to the Balance Sheet, it will be observed that no portion of the receipts of the past year have been invested, although the excess of receipts over expenditure is somewhat greater than that of some previous years. The Council having in view the heavy expense which may be entailed by Parliamentary action, has thought it prudent to keep a substantial balance at call.

There has been a considerable increase in the number of candidates for admission to the Institute this year, and of these 15 have passed the examination in Practical Chemistry prescribed by the Council.

According to the Articles of Association, candidates for the Associateship are required to produce evidence that they have passed through a course of three years' study of Theoretical and Analytical Chemistry, Physics and Mathematics in a manner satisfactory to the Council; also that they have passed satisfactorily an examination in these subjects conducted by a recognised University, College or School. Careful inquiries have been made by the Council as to the course of training in Chemistry, Physics and Mathematics at the various Universities, Colleges, and Schools where these subjects are taught, and a prospectus of the qualifications required of candidates has been drawn up, and also a list of the Universities and Colleges where the curriculum affords opportunities of obtaining the desired instruction.

It was announced in last year's Report that special arrangements had been made whereby Chemists residing permanently abroad and who were desirous of being admitted to the Institute might be examined in Practical Chemistry without coming to England for that purpose. Two Chemists, holding high official positions in India and Japan, have taken advantage of this arrangement, and have been admitted Fellows of the Institute.

An important step has been taken by the Council towards the attainment of an object affecting the Institute, as representing the profession of Chemistry, namely, the incorporation of the Institute by Act of Parliament. For this purpose a Bill has been drawn up, and deposited at the Private Bill office. It is entitled "A Bill for Dissolving and Re-incorporating the Institute of Chemistry of Great Britain and Ireland, and for conferring further

powers upon them, and for other purposes," and will be submitted to the Members for their consideration at an Extraordinary General Meeting to be held immediately after the Annual Meeting. This Bill has been drawn very closely on the lines of the present Articles of Association, but amongst other advantages hoped to be obtained it provides that the Council shall have the privilege of granting Certificates of Membership.

The advantages of Incorporation in this way by Special Act of Parliament are of considerable importance. Not only will the status of the Institute be raised, but it will become a permanent corporation known officially to Government, so that in time it is hoped that all Chemists appointed under the various sanitary and similar Acts, will naturally be chosen from amongst the Members of the Institute.

In the early part of last year a lecture was given by Mr. O'Sullivan on "Polarimeters and their practical application," and Professor Dewar promised a lecture on the applications of the Spectroscope, the delivery of which is unavoidably deferred.

The thanks of the Institute are due to the President and Council of the Chemical Society for the use of their rooms during the past year.

PRESIDENT'S ADDRESS.

IN accordance with annual custom, it now becomes my duty as President to invite your attention to the proceedings and prospects of our association. The abstract statement, already in your hands, in the form of the Report of the Council and Balance Sheet, affords I think matter for satisfaction and encouragement. The first paragraph of the Report of the Council has reference to the keeping up of our numbers; and from it we learn that despite our losses by death—the much regretted losses we have sustained of several eminent Members of our body—the number of our Fellows has increased by five, and the number of our Associates by two. To this may well be added the not unfounded anticipation, suggested indeed in a succeeding paragraph, that in their next year's Report the Council will be able to announce a considerably larger addition to the number of our Associates, the all-important store from which our future Fellows will have to be supplied. Anyhow, we have the gratifying fact of an increasing demand for admission to the Associateship; a result which may fairly be attributed in part to the growing estimation in which the Institute is held, and in part to the greater facilities afforded for the examination of candidates by the thoughtfully considered arrangements that were devised by the preceding Council.

It need not, however, be feared that the desirable increase to which we look forward in the number of our Associates, will be

purchased by any lowering of the requirements demanded of them. You are aware that in addition to the possession of a practical familiarity with chemical operations, tested in all cases by the Institute itself, candidates for the Associateship are required to furnish evidence alike of general scientific training and of general scientific attainment. You are further informed in the Report before you, that during the past year the Council have made a careful inquiry as to the institutions affording the necessary training and satisfactorily testing the attainments of candidates; and that, as a result of their inquiry, they have drawn up for the use of candidates a prospectus of what are the requirements demanded, and a list of the institutions at which these requirements can be supplied. It is obvious, however, from the nature of things, that such a prospectus and list must be provisional ever, and subject to repeated revision from time to time.

It will be felt as a matter of congratulation that the arrangements which were made by the preceding Council, for the examination in laboratory practice of chemists residing permanently abroad, has not been barren in results; and that, as we are told in the report of the Council, two chemists holding high official positions in India and Japan, and even in those distant regions recognisant of the advantages of the Institute, have availed themselves of the facilities afforded by the new arrangements and submitted themselves successfully to our examination.

Second only to the proper fulfilment and development of its functions by the Institute, the state of its finances has a claim upon the consideration of the meeting. Excluding entrance fees and life compositions, the income of the Institute is derived, though in very unequal degree, from three sources, namely, annual subscriptions, fees on examination, and dividends on funds,—the total income from these sources amounting last year, in round figures, to £895. The total expenses incurred during the year, chiefly in

relation to printing and stationery, to examinations, to salaries, and to rent, &c., of offices, amounted to £464, being an excess of income over expenditure of £431,—an excess which, though somewhat beyond the average, is yet fairly in accordance with the results of previous years. The Fellows of the Institute being about four hundred in number, this annual balance of somewhere about four hundred pounds naturally suggests an inquiry as to the practicability of some reduction being made in the amount of the annual subscription at present paid; and some intimation of a probable early reduction of the amount has been already given in previous presidential addresses. In view, however, of the considerable expenses likely to be incurred, as a consequence of the efforts now being made to obtain the incorporation of the Institute either by Act of Parliament or Royal Charter, the out-going Council have not seen their way to recommend an immediate reduction of the Fellows' subscription.

There is not any likelihood, however, that the matter will be lost sight of. There has been, and it is certain there will continue to be, on the part of the Council; who are but the nominees of the Fellows at large, a thorough sympathy with the generally felt desire for a reduction in the amount of the annual subscription at present required. In itself it may not be much, but coupled with the many and ever growing demands for aid and support to scientific objects and societies at home and abroad, its amount may well be felt as pressing unduly on many, more especially of our younger men; and even were this not so, it would still be recognised as objectionable that any call should be made on Fellows of the Institute, in excess of what is actually required for efficiently carrying on the work of the Institute.

It must, on the other hand, be borne in mind that for the satisfactory maintainance of the Institute as an organisation claiming

public confidence and respect, some accumulation of capital and sufficient current income to meet a fairly liberal current expenditure are indispensable. Further, it must be recognised that, from the inevitably slow growth in reputation and influence of such an organisation as the Institute, its early development can only be effected by some amount of continued sacrifice; and that although this sacrifice may indeed press most heavily on the younger Fellows, yet that in their case alone does it hold out the prospect of a reward attainable within their time. It must not be forgotten too that largely as is the Institute indebted for its establishment to the fostering efforts of our first President, it is nevertheless in the main a creation of the younger men among us. It owes its existence to their action; based on the belief, entertained by them and others, that the association of duly qualified practicing chemists into a professional body, would in the end tend largely to the advantage of the associated chemists, and more especially to the advantage of those among them who had the greater length of years to look forward to. It was considered that the general recognition of practicing chemists as members of a distinct profession, including none but educated and qualified men—as members of a profession governed in their conduct by a code of ethics, and having a professional character to maintain—would eventually gain for the entire class a degree of consideration very desirable in itself, and not without a real value, when accorded alike by Governmental and Municipal authorities, and by the members of other learned professions, more especially those of Law, Medicine, and Engineering. It was further thought that the existence of an Institute of Chemistry, by raising the standard of proficiency, and guaranteeing the efficiency of practicing chemists, would tend to the better service of the public; and so acquire for practicing chemists, not only a better defined professional status, but an increased degree of public respect, more especially on the part of the educated and influential classes of the com-

munity. If these and such like objects are not likely to be attained by means of the Institute, its very existence would appear to be without adequate purpose or justification. But if they are likely to be obtained, even in a not too remote future, they are clearly worth making some sacrifice for, and most certainly are not to be attained save at the cost of some sacrifice.

It is a matter of regret that among chemists holding professional, as distinct from professorial positions, there should be found any, though I am glad to say but few of eminence, who still decline to co-operate with their younger brethren in an endeavour to raise the standard of proficiency and advance the interests of the profession to which they and their juniors alike belong. It is indeed to be regretted that while enjoying the prestige of the positions which they occupy—in some cases the prizes of the profession—they should yet hold themselves aloof from their fellow-workers, and refuse to identify themselves in any way with a calling from which they do not feel it beneath them to derive a fair share of emolument. Their abstention can scarcely, in any case, be wise; and cannot but be felt as ungracious. If we are doing a good work, clearly it is for them to aid in the work; while if we are moving in a wrong direction, still more incumbent on them is it to make their influence felt from within, in a persistent effort to direct us aright.

With regard to the future, it has been all along felt that the eventual incorporation of the Institute, either by Act of Parliament or Royal Charter, was eminently desirable, if not indeed essential for the attainment of its objects; and that anything short of this would fail to achieve for the Institute a sufficiently recognized position as a certifying corporation, known officially to Government and to Municipal and other chartered bodies. The matter has been from time to time pressed on the notice of the Council, and definite inquiries, with a view to speedy action, were

in course of being taken under the presidency of my predecessor. Throughout the many Committee and Council Meetings at which the subject has since been considered, no important difference of opinion has arisen as to the particular course to be pursued; while there has been an absolute unanimity with regard to the desirability of some immediate steps being taken. Eventually, while fully alive to the uncertain success and certain costliness of any mode of procedure whatever, the Council have decided to make an attempt in the first instance to obtain a private Act of Parliament, and in the event of failure, then to make application for a Royal Charter. Your sanction to the steps they are taking and propose to take will be asked for at the Extraordinary Meeting that will be held at the conclusion of our present meeting. Anyhow, whether by an Act of Parliament or Royal Charter, and whether by a happy success or after one or several failures, we hope to attain in the end a more satisfactory corporate position than that secured to us by our present Articles of Association, and one more consonant with the public and professional functions it is our purpose to fulfil.

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN AND IRELAND.

THE REPORT
OF
THE ANNUAL GENERAL MEETING,
TOGETHER WITH
THE REPORT OF THE COUNCIL,
BALANCE SHEET FOR 1884,
AND
ADDRESS OF THE PRESIDENT,
PROFESSOR ODLING, M.A., M.B., F.R.S. &c.

London:
PRINTED BY A. P. BLUNDELL & CO., 26, GARLICK HILL, E.C.
1885.

LIST OF OFFICERS & COUNCIL FOR 1885.

PRESIDENT.

W. ODLING, M.A., M.B., F.R.S., &c.

VICE-PRESIDENTS.

SIR FREDERICK ABEL, C.B., D.C.L., F.R.S., &c.

C. A. CAMERON, M.D.

A. DUPRÉ, Ph.D., F.R.S., &c.

J. FERGUSON, M.A., F.C.S.

E. FRANKLAND, Ph.D., D.C.L., F.R.S., &c.

WALTER WELDON, F.R.S., &c.

TREASURER.

DAVID HOWARD, F.C.S.

ORDINARY MEMBERS OF COUNCIL.

A. H. ALLEN, F.C.S.

H. E. ARMSTRONG, Ph.D., F.R.S., &c.

JOHN ATTFIELD, Ph.D., F.R.S., &c.

JAMES BELL, Ph.D., F.R.S. &c.

A. J. BERNAYS, Ph.D., F.C.S.

M. CARTEIGHE, F.C.S.

W. Y. DENT, F.C.S.

C. GRAHAM, D.Sc., F.C.S.

W. HARKNESS, F.C.S.

D. B. HEWITT, M.D.

A. K. HUNTINGTON, F.C.S., &c.

F. HURTER, Ph.D.

F. R. JAPP, M.A. Ph.D., &c.

E. KINCH, F.C.S.

H. McLEOD, F.R.S., &c.

GEORGE H. MAKINS, F.C.S.

B. E. R. NEWLANDS, F.C.S.

F. J. M. PAGE, B.Sc., F.C.S.

J. E. REYNOLDS, M.D., F.R.S. &c.

E. RILEY, F.C.S.

W. J. RUSSELL, Ph.D., F.R.S., &c.

T. STEVENSON, M.D., F.C.S.

W. THORP, B.Sc., F.C.S.

W. A. TILDEN, D.Sc., F.R.S.

T. TYRER, F.C.S.

W. WALLACE, Ph.D., F.R.S.E.

B. WARINGTON, F.C.S.

SECRETARY.

C. E. GROVES, F.R.S., &c.

ANNUAL GENERAL MEETING

OF THE

INSTITUTE OF CHEMISTRY.

THE Annual General Meeting of the Institute was held in the Lecture Theatre of the Chemical Society, at Burlington House, on Monday, the 2nd February, at 5.0 p.m. DR. ODLING, F.R.S., President, in the Chair.

The Report of the Council having been read by the Secretary (see p. 8), the Balance Sheet and Statement of Account for the past year was presented by the Treasurer (p. 11), and the Auditors reported that they had carefully examined the Books of the Institute and found the Accounts accurately balanced.

MR. NORMAN TATE said that it was the wish of many of the Members that a copy of the Report of Council should be sent out some short time before the Annual General Meeting. It would be a great convenience to those who lived any distance from London, as they could make arrangements to attend the Meeting when matters of special interest were brought forward.

The **PRESIDENT** replied that he would bring the matter before the new Council, and had no doubt they would readily adopt the suggestion.

It was moved by **DR. JAMES BELL**, seconded by **MR. BAN-
NISTER**, and carried, that the Report of Council and Balance Sheet be received and adopted.

The **PRESIDENT** then delivered his address (p. 12), and on its conclusion a vote of thanks to the President was proposed by **MR. NORMAN TATE**, who moved that the Address be printed and sent to the Members along with the Report of Council. This was seconded by **DR. FRANKLAND**, and carried unanimously.

The President then appointed **Dr. J. Bell** and **Dr. Percy Frankland** scrutators, and the ballot for the new Council and for the Censors was proceeded with. The President announced that the following gentlemen had been duly elected to serve on the new Council :—

President—**Dr. W. Odling.**

Vice-Presidents—**Sir Frederick Abel, C. A. Cameron, A. Dupré, J. Ferguson, E. Frankland, Walter Weldon.**

Treasurer—**David Howard.**

Ordinary Members of Council—**A. H. Allen, H. E. Armstrong, John Attfield, James Bell, A. J. Bernays, M. Carteighe, W. Y. Dent, W. Dittmar, C. Graham, W. Harkness, D. B. Hewitt, A. K. Huntington, F. Hurter, F. R. Japp, E. Kinch, H. McLeod, G. H. Makins, B. E. R. Newlands, F. J. M. Page, J. E. Reynolds, E. Riley, W. J. Russell, T. Stevenson, W. Thorp, W. A. Tilden, T. Tyrer, R. Warington.**

And that **Sir Frederick Abel, Dr. James Bell, Dr. E. Frankland, and Dr. W. J. Russell** had been elected Censors.

DR. P. FRANKLAND, MR. A. J. GREENAWAY, and MR. H. H. B. SHEPHERD were nominated as Auditors for the ensuing year.

Votes of thanks were then proposed to the President, to the Retiring Treasurer, Dr. Wright, for his valuable services during the past eight years, to the other Members of Council, and to the Auditors.

The PRESIDENT then declared the Meeting to be dissolved.

REPORT OF COUNCIL, 1884,

Presented to the Members, 2nd February, 1885.

At the last Annual General Meeting there were 398 Fellows and 38 Associates on the Register, and at present there are 396 Fellows and 32 Associates, making 428 Members in all. Four Associates have become Fellows. The Institute has to lament the loss of two of its Fellows, Dr. Voelcker, F.R.S., who died at the close of the year, and Mr. G. W. Wigner.

During the year, there have been numerous applications for admission to the Associateship, but there were only six candidates whose preliminary training was of the character prescribed by the Articles of Association, and who could be admitted to the examination in Practical Chemistry conducted by Examiners appointed by the Council. The preliminary training prescribed by the Articles, comprises a course of three years study of Theoretical and Analytical Chemistry, Physics and Mathematics, at some chartered or incorporated University, College or School approved by the Council. There are many Colleges and Schools where the curriculum is such as to enable their students to obtain the requisite instruction; but it does not seem to be generally known to those who are studying for the Chemical profession

that the Institute requires evidence of three years' training in Chemistry and Physics before they can be admitted to the Practical Examination.

Local examinations in Practical Chemistry of candidates for the Associateship, have, this year, been held at Dublin and at Manchester.

The balance sheet shows that the Council have been able to add to the investments of the Institute by the purchase of £500 Consols. It should be remembered, however, that no investment was made in the preceding year, a substantial balance being kept in hand to meet expenses which it was foreseen would be entailed by parliamentary action; and the payment of the preliminary parliamentary expenses incurred forms a considerable item in the outlay of the past year.

At the Extraordinary General Meeting, held immediately after the last Annual Meeting, the draft of a Bill entitled "A Bill for Dissolving and Re-incorporating the Institute of Chemistry of Great Britain and Ireland, and for conferring further powers upon them, and for other purposes," was submitted to and approved by the Meeting; and special powers were given to a Committee consisting of the President Dr. Odling, Sir Frederick Abel, Mr. Carteighe, Dr. Frankland, Mr. David Howard, Mr. J. Millar Thomson, and Dr. C. R. A. Wright, to proceed with or withdraw the Bill, or to apply for a Royal Charter for incorporating the Institute, as they might deem advisable.

It was found unadvisable to proceed with the draft Bill as a Private Bill, Lord Redesdale, as chairman of committees, having decided that the objects sought to be obtained were not such as should be brought before the house in a Private Bill. As the pressure of business was such as to preclude any chance of

introducing the Bill as a Public Bill, the committee, after careful consideration of the matter, determined to apply for a Royal Charter. A Draft Charter has accordingly been drawn up, almost on the same lines as the Draft Bill and the Articles of Association, and has been laid before the Privy Council. There is reason to hope that before long the Charter will receive the Royal assent.

In some respects, Incorporation by Royal Charter may not, in the future, be found so convenient as Incorporation by Act of Parliament, an Act of Parliament being more readily subjected to amendment from time to time. In drafting the Charter, the Committee have kept this consideration in view, and have made the terms as general as possible, leaving all details to be settled by Bye-laws, which will have to receive the approval, both of the Members of the Institute and of the Privy Council.

In the course of last spring, the Institute received and accepted an invitation from the Executive Council of the International Health Exhibition to conduct a Public Conference at the Exhibition Building on the subject of Food Adulteration. The Conference was accordingly held on Monday and Tuesday, July 14th and 15th, and on both days was well attended, and supported by the presence and speech both of dealers in the classes of Food most liable to adulteration, and of prominent members of the Institute and of the Society of Public Analysts. The chair was taken by the President, and the subject introduced by a late Vice-President of the Institute, Dr. James Bell, F.R.S., of the Inland Revenue Laboratory, Somerset House, to whom the Institute is much indebted for a most valuable and interesting address.

The thanks of the Institute are due to the President and Council of the Chemical Society for the use of their rooms during the past year.

INSTITUTE OF CHEMISTRY OF GREAT BRITAIN AND IRELAND.

STATEMENT OF ACCOUNT AND BALANCE SHEET,

FROM 1ST JANUARY TO 31ST DECEMBER, 1884.

[illegible]

**Audited and found correct,
Jan. 7th, 1885.**

R. J. FRISWELL.
P. F. FRANKLAND.

PRESIDENT'S ADDRESS.

ARISING out of the Report of the Council, is one subject for regretful comment, which I am sure you would not like to be passed over without some notice on my part. I refer to the loss which professional chemistry has sustained by the death of our late Vice-President, Dr. Voelcker. To myself, and I have no doubt to many others, Dr. Voelcker always seemed as a type of the deservedly successful professional man. Having at the first a very up-hill prospect before him, and his early steps on the way having to be taken under circumstances of no small disadvantage, he eventually succeeded by dint of industry, good faith, good judgment, and I will add, good feeling, not only in building up step by step a really substantial fortune, but also in winning for himself a position of considerable eminence, professional, scientific and social; and, together with that, the respect and regard of a wide circle of friends and associates. On various occasions it has been my lot to be associated with Dr. Voelcker, sometimes as a professional opponent, sometimes as a professional colleague. As an opponent he was not the less formidable from being always fair-minded and considerate towards those to whom he was professionally opposed; while, as a colleague, he was as strictly loyal to those with whom he was acting, as he was unmistakeably useful to them, by reason alike of the carefully culled information he was sure to bring to bear on the matter in dispute, and of the general respect which had got to be entertained for his opinion.

In sequence to the foregoing remarks I would venture to enlarge for a few moments on the mutual consideration it is so desirable should subsist between members of our own body, placed temporarily in a position of professional antagonism. Among professional Chemists engaged to any large extent in what may be called forensic chemical practice, it happens not unfrequently, and sometimes with curious persistency for a considerable length of time together, that some two or three of those prominent in this department of applied Chemistry, get to be habitually opposed on almost all occasions, and on the most varied matters, to some two or three others also engaged largely in the same department of chemical work. Now it is only in the nature of things that this habitual professional opposition should not tend to increase the personal estimation which the opponents get to entertain of each other's conduct and character; and it is a fortunate circumstance when, by some happy chance, any such habitual professional antagonism is broken by a spell of professional co-operation. For it is only when we come to know a man by intimate association with him in the conduct of a common work and the pursuit of a common interest, that we become fully alive to his good qualities, —it may be different in character from our own, but which we soon learn to appreciate the value of. We unexpectedly discover much to like and respect in our former opponent, we take a more gentle view of his peculiarities, and begin to perceive that in some matters of former offence we had, in our necessary ignorance of the circumstances, taken too harsh, if not, indeed, a wholly incorrect view of his conduct. Unhappily, in every walk of life, over clever and not too scrupulous individuals are to be met with who do not improve upon acquaintance, and for some of whose proceedings there is little to be said in the way of excuse, or even palliation. But as among members of the same body placed temporarily in professional antagonism, the great point is for them not to be misled by their relative positions into any harsh judgments of one another; or into attributing or imagining mis-

conduct in respect to matters of which, situated as they are, it is impossible they should know fully the real circumstances. Moreover, as between hostile chemical witnesses, it should never be forgotten that in nearly every chemical case there is much sound chemistry to be advanced in favour of both sides of the question ; and that it is next to impossible for any one to know fully the two sides, until each side has been made the most of by its respective partizans. And further even than this, it may well be borne in mind that views expressed in direct contradiction to our own views, and even statements of fact made in contradiction to our statements, however shocking, and worse than shocking, they may strike us at the moment to be, are not, impossibly, just the views and statements that we should ourselves have honestly maintained had the matter been presented to us throughout from an opposite point of view ; and had we ourselves known what, in their investigation, our opponents have found out, and had we been, like our opponents, ignorant of what has been exclusively made known to ourselves in the case.

I have already referred to the corrective against harsh and unfounded imputations and conceptions among forensic chemists, which is afforded by the circumstance of their having to co-operate from time to time in carrying out some action in common. Happily, the Institute of Chemistry affords to all professional chemists a permanent bond of union. Here they can be engaged continuously in the conduct of a common work, and be brought into that friendly and appreciative relationship with one another which results from their acting earnestly together, to effect the achievement of a common purpose.

The object for which the Institute of Chemistry has so strong a claim upon our interest, is the maintenance and advancement of the position of the professional chemist ; and that by means, of which the worthiness and public benefit are quite beyond question,

namely, by guaranteeing and raising the standard, alike of competency and conduct, among those engaged in chemical practice. Formal admission into the ranks of a learned profession, demanding on the part of its members the possession of qualifications prescribed by a recognised competent authority, is found in all cases to afford special advantages, social and material, to those so admitted. But, in return for these advantages, it imposes certain correlative obligations ; but for which, indeed, it would hardly confer the standing which admission into the older professions of Divinity, Law, and Medicine, as represented by the Church, the Bar, and the College of Physicians, has long been recognised to confer. In particular, there is the obligation to observe a code, for the most part an unwritten code, of etiquette, adapted to maintain a high tone of professional conduct ; and thereby to bring about a feeling of public respect for the profession in general, and a favourable predisposition towards the individual by reason of the profession to which he belongs. Putting aside extreme cases, it is difficult to formulate in words what constitutes unprofessional conduct ; and it is possible that in the older professions, the line condemnatory of certain practices as inconsistent with the dignity of the calling, and reflecting injuriously on its followers, may be drawn in too old-fashioned a spirit. But in all professions alike, old and new, that sort of competition which takes the form of touting for practice, of open or scarcely concealed self-advertising, of dealing in questionable certificates, and, indeed, of making irregular appeals of any kind to public patronage, are strictly and most properly discountenanced. While in all professions it is more or less difficult in the first instance for unknown men to make themselves known, there are yet, in all professions, recognised and approved modes by which the younger members can and do become known ; without any resort to practices, the general adoption of which would be injurious to the character of the profession, and detrimental to the best interests of its members at large.

It is hardly for the Institute of Chemistry, and certainly not as yet, to lay down any hard and fast rules on these matters. There are advertisements and advertisements, certificates and certificates, which have very little in common with one another. Moreover, in no case would it be advisable for the Institute, even with the hoped for increase of its powers, to legislate in advance of the general feeling of the Fellows. Much of what is desired, and that has been felt by the Council to be desirable, must be left for the present, and it is to be hoped always, to a growing sense of common interest and mutual obligation among practising chemists as members of a corporate body; and to the development among them of a more strictly professional tone of feeling, repressive of everything which in other professions is thought to be derogatory.

The Institute has to regret the retirement of Dr. Wright from the office of Treasurer, which he has held continuously from the period of our Incorporation. For some time past Dr. Wright has found that his current engagements did not allow of his attending the Meetings of Council and Committee with the regularity which he felt to be requisite, and at the last Council Meeting of the old year, he tendered his resignation; which, in view of the grounds on which it was tendered, the Council had no choice but to accept; with an earnest expression of regret that they were to be deprived of his special services as Treasurer, and were to lose for a time, it was hoped for only a short time, the advantage of his aid and advice as a colleague. The Fellows are not likely to forget the altogether exceptional services rendered to the Institute by Dr. Wright in the troublous days of its early existence and gestation. He carries with him the best wishes of his old colleagues on the Council, who can only regret that the gain which they trust accrues to him from his increasing engagements, should involve them in the present loss of his active co-operation with them.

Reference has been made in the Report of the Council, to the very successful Conference which was conducted by the Institute at the International Health Exhibition. Independently, both of the interest which attached to the holding of the Conference, and of the value of much that was brought forward at its sittings, the gathering has additional claims upon our remembrance; as having resulted from a formal invitation proceeding from a body appointed under a Royal Commission, and addressed to the Institute as the acknowledged representative of professional chemists. This is, I believe, the first public occasion on which the Institute of Chemistry has been officially recognised as occupying in relation to chemists, the same sort of position as that occupied, for instance, by the Institution of Civil Engineers, and the Institute of British Architects in relation to engineers and architects respectively.

The occasion of the Conference has been the only occasion on which the Fellows of the Institute have been called together during the past year. Throughout the year, much of the time and attention of the Council has been expended in considering what should be their action in the different circumstances which have arisen, and in taking successive action, with regard to the incorporation of the Institute either by Act of Parliament or by Royal Charter. And with this important matter pending, it has been thought advisable to leave other matters, financial, disciplinary, and social, also in abeyance. The position of affairs in respect to our present mode of incorporation, has long been felt to be unsatisfactory. Cases have arisen in which some action of the Institute, both among its own members and in relation to external bodies, seemed to be called for, but in which it was thought that no action at all was preferable to such action, as from our present unsatisfactory status it was feared could not be exerted with effect. If by reason of the unsuitability of our present mode of incorporation to the purposes it is our object to fulfil, any public representations of our

body were not likely to be made with much prospect of success, or scarcely even of attention, it was felt better that they should not be made at all.

With our application for a Royal Charter still under the consideration of the Privy Council, it is obviously unadvisable that any statement of the measures that have been taken to promote the success of our application should be put forth and considered at the present time. Suffice it, that acting under the authority of resolutions passed at the Extraordinary General Meeting of the members of the Institute, held last year, and specially convened for the consideration of the subject, we have spared ourselves no pains, and both as individuals and as a Council have done our best, in the matter entrusted to us. But there is one point in relation to our proceedings which I cannot altogether pass over, and that is the warm interest which has been displayed on our behalf by Sir Lyon Playfair, and the readiness with which he has placed his time and efforts at our disposal. We owe to him an influential representation of the nature of our aims, and of the desirability, from a public point of view, of our being accorded the power to carry them out efficiently. And if, as we have reason to hope, our application to the Privy Council should prove successful, its success will be due in no small measure to his hearty co-operation with us, and to his personal exertions in making our way smooth.

INSTITUTE OF CHEMISTRY
OF
GREAT BRITAIN & IRELAND.

(Incorporated by Royal Charter.)

PRESIDENT'S INAUGURAL ADDRESS,

November 6th, 1885.

INSTITUTE OF CHEMISTRY.



PRESIDENT'S ADDRESS.

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THE INSTITUTE OF CHEMISTRY, as a now existing association, only came into being on the 13th day of June of the present year, 1885, when some four hundred of us were incorporated by Royal Charter into a body politic, under the name of the Institute of Chemistry of Great Britain and Ireland; and were entrusted by the charter of our incorporation, alike with certain privileges and with certain public duties and responsibilities. But although as an association now in being, we can claim an existence of but a few short months' duration, it is not merely for so brief a period as this, that a definite bond associating us with one another in a common work, has replaced that informal tie of friendly co-operation which, among the seniors of our body and among their elders and predecessors, can be traced back for the distance of fully half a century. It chanced indeed about nine or ten years ago, as a consequence of occurrences then taking place, that a long pent up feeling of dissatisfaction at the deficiency among us of means for exerting a common action and influence, began to manifest itself in a plainly outspoken way. As an outcome of this feeling, a movement was set on foot, more especially by the younger members of our craft, for bringing about a definite organisation of

professional chemists. This movement, with which Dr. Frankland, who had long been impressed with a sense of the deficiency, very early identified himself, soon found in him its legitimate leader. After much consideration of various proposed means for carrying out the object desired, a Memorandum of Association was at length drawn up ; and eventually, on the 2nd day of October, 1877, and following day or two, some hundred and fifty of us were definitely incorporated under Articles of Association, in accordance with the provisions of the Companies' Act of 1867 ; and were registered by the same name that has been but so lately accorded anew to our body by Royal Charter. Of the circumstances attending the formation of this original Institute of Chemistry, a full account is given in Dr. Frankland's presidential address, delivered at the first general meeting of the Institute, held on February 1st, 1878, the members at that time consisting of 7 Associates and 225 Fellows. The original Institute of Chemistry existed, prospered, and carried on its work for between seven and eight years ; until at a general meeting of the members, held on the 24th of April of the present year, a special resolution was passed requiring that the Institute founded in 1877, should, with a view to re-incorporation on a more satisfactory footing, be voluntarily wound up ; and in accordance with this resolution, it was definitely wound up and ceased to exist on the 30th of June last, 1885, although, indeed, certain ceremonial observances pertaining to its obsequies have even yet to be performed. At the time of its dissolution on June 30th, the original Institute of Chemistry consisted of 33 Associates, most of whom had been subjected to examinations conducted by the Institute, and of 403 Fellows, some few of whom had passed through the grade of Associateship.

The original Institute had the advantage of being pioneered during the early days of its existence by its first President, and it might almost be said founder, Dr. Frankland. After him succeeded one who had all along taken an active part and interest in its organisation and welfare, Sir Frederick Abel, to whose loyal and judicious action as President, the then Institute was largely indebted during a period of its existence when its strength was not fully assured, and when the outburst of enthusiasm to which it owed its origin and early prosperity had in some measure, at least, cooled

down. On the termination of Sir Frederick Abel's three years tenure of office, I was selected to occupy the position so notably well filled by my two predecessors, whose continued interest in the work of the Council, and alike never-failing personal co-operation with me in the always responsible, and at times, anxious duties of the position to which I succeeded, it is out of my power sufficiently to acknowledge. With my presidency, the original Institute of Chemistry, as a particular corporate society, has come to an end, and the present Institute, as a technically new corporation, has come into existence.

But though technically a new corporation, the present Institute is in reality a continuation and development of the original association. By a resolution of the expiring Institute, its property was made over to the present Institute; and by a provision of the Royal Charter incorporating the present Institute, the members of the original Institute are constituted the first members of the present Institute; and the President, Officers, and Members of Council of the original Institute are constituted respectively the first President, Officers, and Members of Council of the present Institute, and are charged with power and authority to carry on the work of the present Institute according to the rules and customs of the original Institute, until the Bye-laws of the present Institute have been settled at a general meeting of the members, and have been submitted to, and allowed by, the Lords of Her Majesty's Privy Council. In connection with this subject, it may be well to mention that a meeting of the Council of the present Institute, being as aforesaid the persons who constituted the last Council of the original Institute, was held a week ago on the particular day appointed in the Charter for their first meeting, namely on the last Friday in October, and that at this Council meeting, the subject of framing draft Bye-laws for the Institute, to be afterwards submitted to a general meeting of the members, was actively taken in hand; for until our code of Bye-laws has been settled by a specially convened general meeting, been confirmed by a subsequent general meeting, and been sanctioned by the Lords of the Council, no fresh election of President, Officers, and Members of Council of the Institute can validly be held.

By the attainment of our incorporation by Royal Charter, in lieu of the Articles of Association by which we have, until now, been banded together, we become for the first time an officially recognised professional body, known officially to Government, and both to municipal, and to other professional bodies. Further than this, we have had formal acknowledgement made of our fitness to be charged with certain public duties and responsibilities, and have established our claim to be entrusted with correlative rights and privileges. Our profession, the public utility and importance of which have, in this way, received at length so formal a recognition, is one that we may all of us feel a just pride in belonging to. It is certainly not with bated breath that we need speak of ourselves as professional chemists. Chemistry, indeed, as a branch of knowledge, pertains not alone to the student, but exists also for the practitioner, and still more for the public. Of exceptional interest as a subject of study, it is of scarcely less interest from its manifold practical applications, and as a contributor to the daily wants and enjoyments of the community;—a community in which all are bound up with one another, and are under obligation to render services to one another. Nowadays, the ever extending and increasingly complex wants of the community create a greater and greater demand for what are known as professional services, and for professional services of a kind and extent that cannot be rendered by the parson, or the doctor, or the lawyer; or yet by the amateur engineer, or the amateur electrician, or the amateur chemist. It is the competent services of professional men, specially trained in their several departments, that are alone adequate, and are alone accordingly in request. To the trained professional chemist, as to other professional men, interests of occasionally enormous value are committed; and some notion of the consideration in which his work is held may be gathered from the extensive resort had everywhere to his services, even by the great departments of state and by the most renowned and important of municipal and other corporations.

Among government departments, the War Office, the Home Office, the Board of Trade, the Local Government Board, and the Board of Inland Revenue, have each their respective permanently attached staffs of professional chemists, with whom from time to time, in relation to special subjects of enquiry, other chemists of

distinction are associated. Among corporations and public institutions of all sorts, the City of London, the Metropolitan Board of Works, most of the great provincial Corporations and Local Boards, the Royal Mint, the Houses of Parliament, the Elder Brethren of the Trinity House, the Thames Conservancy, the Royal Agricultural Society, the great Gas and Water Companies, the different Metropolitan Vestries and Local Boards, and many more such bodies, have recourse alike to the regular services of their permanently attached professional chemists, and to the supplementary services of various others among us whom they find it necessary to call into consultation from time to time. And of yet greater extent as a whole, is the habitual resort that is had to the services of the professional chemist by mercantile and manufacturing firms and associations, engaged in almost every variety of commerce, manufacture, and industrial enterprise. Alike, then, by the great departments of state, and by commercial firms of world-wide renown, and by traders and producers occupying a less distinguished position, the multifarious services of the chemist are ever in request. And in respect to ourselves, by whom these services are rendered, from those of us occupying the leading positions in the profession, to the most humble individuals practising in our ranks, we are all associated in a common work, and have all a common credit to maintain, and are all under mutual obligation to co-operate with and advance the interests of one another.

It would seem, however, from observations not unfrequently hazarded by some very superior persons, whose happy mission it is to put the rest of the world to rights, that there is something derogatory to the man of science in making his science subservient in any way to the requirements of his fellows, and thereby contributory to his own means for the support of himself and of those depending upon him. Now, on this not uncommon cant of the day, a little plain speaking would seem to be very much wanted. While the investigation of nature and the interpretation of natural law are admittedly among the highest, as they are among the most delightful of human occupations, the right application of natural law to effect desirable objects is in itself a scarcely less worthy occupation; many of these objects being of paramount importance, and attainable only by the exercise of high scientific sagacity and skill, aided by a fertility of resource and a persistent

elasticity of spirit, ready ever to cope with the successive novel difficulties found to be continually opposing themselves.

In this matter, as in so many others, the sense of proportion is but too often lost sight of. Because the investigations of a Darwin, a Dalton, a Joule, and a Faraday have an importance of which few among us can adequately conceive even the measurement; because among the scientific men now or but lately living in our midst are to be found yet others whose investigations in pure science have not only won for them a high renown, but have earned for them the gratitude, and should have obtained for them the substantial acknowledgments of their country and the world; and because even the minor investigations and discoveries that are ever being made in pure science have all of them their merit and their value, it does not follow that the mere accomplishment, it may be in an abundant leisure, of two or three minor investigations, however creditably conducted, are to lift their authors into a scientific position, altogether above that of men whose laborious lives have been spent in rendering their great scientific attainments directly serviceable to the needs of the state and of the community. The accomplishment of such-like investigations does not entitle their authors to be exempted from the duty of earning their own livelihoods, or give them a claim to be endowed by the contributions of others with the means to jog leisurely along, without responsibilities and without anxieties, the far from thorny paths of their own favourite predilection. However heterodox it may be thought by some, the best of all endowments for research is unquestionably that with which the searcher, relying on his own energies, succeeds in endowing himself. The work to which our natures are repugnant, not less than the work which entrances us and hardly makes itself felt as work at all, has to be done. In some degree or other, we have most of us to obtain our own livelihood; and harsh as may seem the requirement, it will, I suppose, be conceded that the necessity put upon the mass of mankind of having to earn their daily bread, is an arrangement of providence which has on the whole worked fairly well; and, further, that the various arrangements hitherto tried for exempting certain classes of men from the necessity of having to earn their daily bread, in order that they might give themselves up to the higher spiritual or intellectual life, have scarcely, to say the least of

them, worked quite so satisfactorily as they were intended to. All of us are, without doubt, qualified for higher things than the mere earning of our daily bread; but the discipline of having to earn our daily bread is, in more ways than one, a very wholesome discipline for the mass of us, and even for the best of us. It may here and there press hardly on particular natures, but it is rarely an impediment to the achievement of the highest things by those having the judgment, the determination, and the self-denial necessary above all else for their achievement. Not a few of us may consider ourselves fitted for higher work than the gods provide for us, and fondly imagine what great things we should effect if we could only have our daily bread supplied to us by the exertions and endowments of other less gifted mortals. But experience is not on the whole favourable to the view that, the conditions being provided, the expectation would be realised. Experience, indeed, rather favours the notion that it is primarily the necessity for work, and association with those under a necessity to work,—those in whom a professional spirit has been aroused, and by whom work is held in honour,—that creates and keeps up the taste and the habit of work, whereby the vague ambition to achieve is turned to some productive account. Take, say, a thousand of the most eminent men the world has produced, and making no allowance for the large influence of descent or training, or of association with those to whom work is a necessity, or having been a necessity has become a habit, consider what proportion of these men have, by their means and position in early life, been free from any stimulus or obligation to exert and cultivate their powers; and consider, on the other hand, what proportion of them have been stimulated to exertion and success by the stern necessity of having either to achieve their own careers, or to drop into insignificance, if not indeed into actual or comparative degradation and poverty. We ought, indeed, all of us to be students, and to be above all things students; but the most of us cannot be, nor is it desirable, save in the case of a special few, that we should be only students. We have all our duties to fulfil in this world, and it is not the least of these duties to render ourselves independent of support from others, and able ourselves to afford support to those depending upon us. Fortunate are we in being able to find our means of

support in the demand that exists for the applications of a science which has for its cultivators so great a charm. To judge however, not indeed by their coyness when exposed to the occasional temptation of professional work, but rather by their observations on the career of others, the most sought after and highest in professional repute, the pursuit of professional chemistry is, in the opinion of some among us, a vocation open to the gravest of censure. It is praiseworthy, indeed, for the man of science to contribute to his means of livelihood by the dreary work of conducting examinations in elementary science for all sorts of examining boards, and by teaching elementary science at schools and colleges, and by giving popular expositions of science at public institutions, and by exchanging a minor professorial appointment affording abundant opportunities for original work, in favour of a more lucrative and exacting appointment involving duties which, if rightly fulfilled, must seriously curtail these same opportunities. It is praiseworthy of him to add to his income by compiling manuals of elementary science, and by writing attractive works on science for the delectation of general readers; but it is forsooth derogatory to him, if not a downright prostitution of his science, that he should contribute to his means of livelihood by making his knowledge subservient to the wants of departments, corporations, and individuals, alike of great and small distinction, standing seriously in need of the special scientific services that he is able to render them.

A glance back suffices to show how foreign to the ideas of the great men who preceded us is this modern notion of any reprehensibility attaching to applied or professional science. In his earlier days, Professor Faraday was largely employed in connection with all sorts of practical questions, and until almost the close of his life, continued to act as scientific adviser to the Trinity House. No man was more constantly occupied in advising with regard to manufacturing and metallurgic and fiscal questions than Professor Graham, who ended his days holding the official position of Master of the Mint; a position in which he succeeded another eminent man of science, less known, however, as a chemist than as an astronomer, Sir John Herschel. As in these typical instances, so also in very many others; and if I may be allowed to draw at all on my own personal experiences, I would say that

some of the most pleasant remembrances of my past life relate to the occasions on which I had the good fortune, early in my career, to be brought into association as a junior professional colleague, with some among the then most eminent of scientific men. It did not indeed happen to me to be associated in this particular manner with Faraday, or Graham, or Daniel, or yet with their frequent colleague Richard Phillips, one of the early Presidents of the Chemical Society, for many years the almost omniscient editor of the *Philosophical Magazine*, and the leading professional chemist of his day. But among those who have passed away from us altogether, or have for some cause or another quitted our ranks, my recollection goes back to professional association with a host of distinguished men of science; whose membership would, of itself, suffice to ensure an honourable estimation for any profession to which they belonged. On different occasions it has been my lot to be engaged in advising on various questions in conjunction with Arthur Aikin, a personal friend of Priestley, writer of a still valuable dictionary of chemistry, the first Treasurer of the Chemical Society, and for many years the leading authority in regard to chemical metallurgy; with Dr. Thomas Anderson, of Glasgow, an assiduous and successful worker in the then little familiar field of organic chemistry, and for many years consulting chemist to the Highland Society; with Professor Brande, the pupil and successor of Davy, at the Royal Institution, long time one of the Secretaries of the Royal Society, an early President of the Chemical Society, and in his professional capacity, Director of the Die Department at the Royal Mint; with Sir Robert Christison, of Edinburgh, one of the most scientific of British toxicologists and pharmacologists, an original worker in many fields of inquiry, President of the Royal Society of Edinburgh, and a selected, though not an actual President of the British Association; with Dr. Warren De La Rue, the friend of us all, more than once President of the Chemical Society, a past President of the Astronomical Society, and a Vice-President and Bakerian Lecturer of the Royal Society; with Dr. Hofmann, the first Professor at the College of Chemistry, and Assayer for many years to the Mint, one who can claim so many of us as his pupils, and who as a professional chemist, no less than as an investigator and teacher, ever set an example of energy and vivacity to all his associates, working on one occasion

the long night through in order to extract from paraffin-oil a specimen of benzene, ready for exhibition in Court on the following morning,—an instance of professional devotion which, as the presence of my immediate predecessor, Sir Frederick Abel, reminds me, is not wholly without a parallel. Proceeding in my enumeration, I may mention Sir Robert Kane, some time Vice-Chancellor of the Queen's University, Ireland, a teacher and worker of originality and wide erudition, to whom chemists are indebted for their now familiar conception of the radicals amidogen and ethyl; also Dr. Allen Miller, Professor at King's College, London, and Assayer to the Mint, a President of the Chemical Society, and for many years Treasurer of the Royal Society; also Sir Lyon Playfair, then Professor of Chemistry at the University of Edinburgh, now a member of her Majesty's Privy Council and President of the British Association, one to whom we are under obligation for his hearty sympathy with the objects of the Institute, and for the unsparing exercise of his efforts and influence on our behalf; also my relative by marriage, Alfred Smee, a pioneer in electro-metallurgy, and inventor of the galvanic battery by which for nearly half a century the greater part of the galvano-plastic work of this country has been effected; and lastly Robert Warington, chemist for many years to the Society of Apothecaries, the founder and first Secretary of the Chemical Society, and a frequent contributor thereto of his characteristically ingenious observations. And not only with the above-named eminent men of science, but with many others also, has it been my fortune to be professionally associated, including, I regretfully have to add among those who have passed away from us, some of the most distinguished original members and warmest friends of the Institute, as Dr. Stenhouse, Sir William Siemens, Professor Way, Dr. Angus Smith, Dr. Voelcker, and Mr. Walter Weldon. Moreover, among the leading men of science of the present day, Sir Frederick Abel, Mr. Crookes, Professor Dewar, Professor Frankland, Mr. Vernon Harcourt, Sir Henry Roscoe, Dr. Tyndall, and Dr. Williamson are either the holders of definite professional appointments, or are otherwise more or less actively engaged in the work of the professional chemist. A profession surely stands in need of no apology which includes

and has included in its ranks within such a limited period, such a host of distinguished members.

So far, moreover, from his professional eminence and usefulness being made a matter of reproach to the scientific man, it should constitute rightly a claim to his higher consideration; and far from being accounted a disparagement, should be held as an addition to his scientific standing. In the professions most allied to our own on the one side and on the other, this is well recognised. The physician and the engineer are not merely students of pathology and of mechanics, however important may have been their contributions to pathology and mechanics respectively, but they are the distinguished craftsmen in their respective arts. And whether or not they may have made important contributions to pure science, their rank as eminent scientific men is everywhere and rightly conceded to them. A lucky chance happening to any professional man may indeed bring him to the front, but no succession of lucky chances can ever happen that will of themselves prove adequate to keeping him there. Great qualities are ever necessary to sustain great professional positions; and to be for years one of the foremost in a scientific profession, is of itself at least as substantial an evidence of scientific attainment as is the publication of a memoir on some minute point, say of anatomy, or chemistry, or hydrodynamics, for example. And it is so recognised, and very properly recognised, even in quarters where pure science admittedly reigns supreme. Leading engineers and leading physicians and surgeons are every year admitted into the Royal Society, not on account of the importance attaching to any special contributions they may have made to mechanical or pathological science, but mainly because of their eminence in their several professions; in which, to be eminent is of itself an evidence of scientific character and of extensive scientific knowledge. It may indeed be taken as beyond question that to obtain and retain a leading position in a scientific profession, needs among other things the possession of high scientific attainments. I say among other things, for without moral qualities in a notable degree, sympathy, endurance, courage, judgment, and good faith, no such professional success is conceivable. Professional eminence is the expression necessarily of scientific ability, but not of scientific ability alone. The self-engrossing science of the student

has to be humanised by its association with the cares and wants, and the disappointments and successes of an outside world.

And now comes the very practical question, what advantages are likely to result from our particular organisation; what gain to chemical science, what gain to the public, what gain to ourselves? Now these several matters are so bound up together, that we can scarcely isolate them from one another sufficiently even to allow of our taking them into separate and successive consideration. Any gain to ourselves as a body must depend on the higher esteem in which we are held by the public; and the higher esteem in which we are held by the public will depend in the main on the greater value of the services that we render; while the extent of service we may be able to render will be dependent again on the progress of chemical science generally, and on our own ever increasing proficiency as practical chemists. All three conditions act and are reacted on by one another; but despite their interdependence, we may yet be able to concentrate our chief attention on them one after the other. In the first place then, as regards the gain that may be expected to accrue to chemical science, it is clear that the extension and improvement of chemical education, is the one predominating means available to us for effecting the main purpose of the Institute, namely the advancement of professional chemistry. The higher and more thorough the training of the professional chemist, the better will he be able to fulfil the demands made upon him, and the more will his services and the profession to which he belongs be held in respect. It will probably be taken for granted that, by reason of our organisation into a professional body, the inducements we shall be able to offer to those having it in contemplation to engage in the work of professional chemistry, will suffice to create in them a desire to affiliate themselves to our body, and cause them with that intent to educate themselves up to the standard of our requirements; and further than this, it will be conceded that the recognition of chemistry as an organised profession, standing on the same footing, say, as the professions of medicine and of engineering, and like these professions offering a definite career to its followers, and conferring on

them the status that results from admission to the membership of a not undistinguished corporation, amenable to their influence, and with its high places open for their attainment, will be the means of attracting into the profession a class of students having the capability and determination to achieve for themselves the highest qualifications obtainable. And it may fairly be anticipated that in other ways also, some of them to be presently referred to, the Institute of Chemistry will add alike to the social and substantial attractiveness of the chemical profession; whereby an increasing number of students, possessing a higher average of means and of literary cultivation, will desire to enter its ranks. Now, an increase of such-like students implies necessarily an increase and development of chemical education, with all its attendant influences on the progress of even pure science. It must not be forgotten, either, that it is to the present demands of applied chemistry in some form or another, that the greater number of the schools and laboratories of chemistry throughout the country largely owe their origin and prosperity. That the cultivators of chemistry are numerous beyond the cultivators, say, of botany or of mathematics, is dependent not so much on the greater interest of the study, as on the greater demand made for what the cultivator of chemistry is able to supply; while the very number of the cultivators affects the largeness of the field from which the distinguished cultivators successively emerge.

That the Institute of Chemistry, not only by what may be hereafter demanded as a necessary condition of admission to its membership, but far more by what may be required for the attainment of reward, distinction, and leadership within its ranks, will exert a potent influence on chemical education, cannot, indeed, be doubted. Our calling differs from most others in this, that the questions professionally submitted to us are essentially scientific questions, ever calling on us to deal with them in a scientific spirit. Forming as they do, for the most part, the subjects of a veritable scientific investigation, it is to a training in investigation, more than to any other form of chemical education, that fitness for the determination of these questions, and the professional success attendant on their determination, must depend. At the present time, the chemical education of the country, much as it has advanced within the last thirty years, cannot but be felt as deficient.

and deficient mainly by reason of its brevity. To become acquainted in some measure with the great body of facts and their relationships to one another, to acquire a familiarity with the more important literature, doctrine, and philosophy of the subject, and to obtain some degree of practical skill and insight into its experimental methods, is as much as can be expected of the ordinary student, within the present brief period of his educational career in science. Anyhow, he can rarely get beyond the stage of finding out for himself, in a few select cases by way of practice, what has long before been found out and established by the investigations of others. These are matters that can be more or less satisfactorily tested by examination; and with all the drawbacks incident to the examinational system, it has yet its unquestionable merits, and is so far a necessity that it is difficult to see how its use can be wholly dispensed with. On the path of original inquiry, the time at the disposal of the ordinary student but rarely permits him to enter; and with the demands of forthcoming examinations pressing upon him, it is scarcely desirable that he should enter. But the education in science that can be satisfactorily tested and scored up by examiners, is but the beginning of a really scientific education. With a professional career before him, the student of chemistry can afford to prolong the period of his education, and devote himself to work which looks for its reward in other than a mere examinational success. A training in the pursuit of original inquiry is not only the particular training which, more than any other, fits him for the work of his future profession, but the achievement of success in such inquiry constitutes his surest means of making himself known, and of becoming entrusted with the professional work for which his training has especially qualified him. An increasing demand set up in this way, for instruction and guidance in the work of research, cannot but react beneficially on the methods of the scientific teacher; while the early formation of a taste for research will not be without a far-reaching influence on the after life of the student. But more than this, among the number of young men taking up the study of chemistry by reason of its opening out to them a professional career, and cultivating original work as the recognised means of qualifying themselves for that career, some proportion at any rate will find in the pursuit of research, the vocation for which they are especially

qualified, and for which they will, in the seed-sowing time of their life, be willing to make, as others have made before them, even considerable professional sacrifices. And the advancement of professional chemistry may be expected to affect the progress of pure science in yet another way. To how many of us has not a study of the subjects of our professional work, and the exceptional opportunities so freely afforded us for their study professionally, created a wide extension of our knowledge, even if it has not opened out what have proved to us altogether new fields of inquiry. To how many of us, further, has not a study under the advantageous opportunities afforded us, of the subjects of our professional work, suggested fruitful topics of purely scientific interest, which but for their having been first brought under our notice professionally, would never have occurred to us as matters for investigation at all. With the ever extending need for the services of the professional chemist, and with the holders of chemical appointments spread, as they are becoming spread, all over the country, and with a supply of young chemists, well educated generally, specially trained for their work, imbued with a spirit of inquiry, interested in the solution of scientific problems, and practised in the methods of their solution, what progress, alike in pure science and in the higher applications of science, may not be hoped for, as a result of that advancement of the professional education and professional status of practising chemists, which our organization is calculated so largely to influence and bring about.

As regards the gain that will be likely to accrue to the community, from the influence which the Institute of Chemistry cannot fail to exert in maintaining and raising the standard of capability and professional character among practising chemists, it may be useful to quote a few paragraphs from the preamble of the Charter under which the Institute has now been incorporated. It is therein represented

“That the profession of analytical and consulting chemistry is one of great importance to the public, and having regard to the rapidly increasing application of chemistry to legal investigations, to public health, to the adulteration of food, to agricul-

ture, and to the arts and manufactures, it is desirable that persons practising the profession of analytical and consulting chemistry should have both a practical and scientific knowledge thereof.

“ That it is a matter of increasing importance to government departments, to corporate bodies, and others requiring the assistance of persons competent to practice in analytical chemistry and to advise in technological chemistry, that such persons should be properly trained, and that their qualifications should be attested by certificates of competency granted by a scientific body possessing sufficient status; and that at present there is no institution or corporate body which has power to issue such certificates.

“ That the said Institute was not established for the purposes of gain, nor do the members thereof derive or seek any pecuniary profits from their membership, but the society aims at the elevation of the profession of consulting and analytical chemistry, and the promotion of the efficiency and usefulness of persons practising the same, by compelling the observance of strict rules of membership, and by setting up a high standard of scientific and practical proficiency.

“ That it would greatly promote the objects for which the said Institute has been instituted, and would also be for the public benefit, if the members thereof were incorporated by Royal Charter, with power to afford facilities for the better education and examination of persons desirous of qualifying themselves to be public and technical analysts and chemical advisers on scientific subjects of public importance, and with power to grant such certificates of competency as aforesaid ; as, besides other advantages, such incorporation by Charter would be a public recognition of the importance of the profession of analytical and consulting chemistry, and would tend gradually to raise its character, and thus to secure for the community the existence of a class of persons well qualified to be employed in the responsible and difficult duties often devolving upon them.”

In relation to the topic of public utility dwelt upon in these paragraphs, it would, under any circumstances, be superfluous to

enlarge on the general proposition, as to the dependency of national progress on the extension and application of scientific knowledge; and it is especially unnecessary at the present time, in view of Sir Lyon Playfair's recent disquisition on the matter in his presidential address to the British Association. But it may be safely urged, that with scarcely any other department of practical science is national progress so intimately connected, as it is with the department of chemistry. The special applications of chemistry, in relation to agriculture, to metallurgy, to technology generally, and to matters and questions of war-material, of gas-supply, water-supply, food-supply, and of hygiene, medicine, and jurisprudence, are ever being resorted to for the advancement and elucidation of these important arts and matters, affecting so largely the individual and national life; whence it should follow that to increase the number, and insure the greater competency of the professional men entrusted by the community to deal with these affairs, may constitute a matter of even national concern. And as regards departments, corporations, boards, and persons in general, needing the services of the professional chemist, the gain to them in having an increased supply of more cultivated and better trained men from whom to make their selection, and from having it in their power to satisfy themselves of the capability and training of those offered for their selection, by the assurance of a responsible body specially qualified and authorised to give that assurance, would seem to be beyond question. As an incident of the past it may fairly be noted, without any disparagement to the meritorious body of men now holding the positions of public analysts throughout the country, that at the time, not so long ago, of the Act of Parliament coming into force under which these appointments were first made, the choice of really competent candidates was very small, that the several boards having the responsibility of making the appointments had no means of assuring themselves of the competency of the different candidates, and that, as a result, not a few unfortunate appointments were made, which had somehow or other to be in effect revoked; while even among those public analysts who have since amply justified their appointment, some at least feel themselves considerably hampered in their proper chemical work, and unable to take up, as they would desire, other branches of chemical work, by the circumstance of that work

being one for which they have not had the advantage of an adequate early training. Of such a state of things, the existence of the Institute of Chemistry should prevent any possible recurrence,; while it has the further merit of affording to the public yet other advantages of a wholly different kind. For by its means, there will be offered to all persons and boards requiring the services of the professional chemist, not only an increased supply of better trained men, and an assurance of the sufficiency of their training, but there will also be offered to these persons and boards, the advantage of having to deal with men of education and standing, having a professional character to maintain, amenable to the influence of association with the leaders of their profession, under obligation to observe a high tone of professional conduct, and liable to have any departure from such conduct made the subject of inquiry and possibly of reprimand by their fellows; or it may be, even a cause of their suspension or exclusion from the ranks of the professional organisation, their continued membership of which could only bring into discredit.

And now as regards the advantage which the existence of the Institute of Chemistry is likely to afford to ourselves. To those of us who have already attained the higher steps on the ladder of success, it can scarcely afford any personal advantage whatever, save that which may result from a gradual increase in reputation of the profession to which we belong. But to all alike, as members of the general body, regardful of our past and present obligations to the profession, and taking a lively interest in its future well-doing, the incorporation of the Institute of Chemistry by Royal Charter cannot but appear as a matter of personal congratulation. It will be our own fault if the so incorporated Institute does not prove a means of raising the character and increasing the usefulness of the chemical profession, of promoting the influence it should be able to exert, and of contributing to the public estimation in which its individual members will be held. The general recognition of practising chemists as members of a distinct profession, constituted only of specially trained men, can scarcely fail to secure for the

entire body a degree of consideration and respect very desirable in itself, and not without a substantial value when accorded alike by state departments, and by municipal and other local authorities, and by members of those particular learned professions with which the work of the chemist brings him more especially into association. And with the growing respect entertained for the profession at large, there cannot but spring up an increasingly favourable, and not unserviceable feeling towards the individual, by reason of the profession to which he belongs. In all cases, indeed, formal inclusion within the ranks of a learned profession, necessarily limited in its numbers, demanding from its members the possession of special qualifications, and exacting from them the obligation to observe a high standard of conduct, is found to afford noteworthy advantages, social and material, to the persons so included. The degree of advantage attaching to membership of an organised corporation will depend, of course, on the character, reputation and traditions of the particular corporation. A new corporation like our own, having no traditions to fall back upon, has to create its reputation, acquire its influence, and make its own history. There is much that the Institute may do for its members in the way of good ; while by the exercise of an influence for good, it will acquire for itself a degree of respect enabling it to effect yet greater good. There are matters affecting, for instance, the mode in which scientific knowledge is brought to bear on questions of legal and quasi-legal inquiry, in which the Institute of Chemistry may both bring about a real improvement and effect a removal of prevailing misapprehensions. Not that this subject is really of so much importance in itself, the functions of a chemical expert forming but a small part of the functions exercised even by the particular chemists most engaged in this department of work ; while it constitutes a quite insignificant fraction of the sum-total of work done by the profession at large. It is, however, the particular part of a professional chemist's work which brings him most prominently before the general public ; and has not unfrequently served as the basis of by no means flattering comments on the value of scientific opinion in relation to forensic inquiries. But in any matter of dispute whatsoever, a comparison of all that can be rightfully brought forward on the one side, with all that can be rightfully brought forward on the other, would appear to be one of the most

certainly sure modes of getting at the actual truth of the disputed matter. And in this way, the conflicting testimony of opposed scientific experts,—neither of them having had the whole facts and arguments before him, as it is scarcely possible indeed that he should have, but each of them having had the subject brought under his notice from an opposite point of view,—becomes a necessary condition of the legal threshing out of scientific questions. The retained scientific expert is an outcome of the necessity felt for his services ; and his function is not less honourable, and is indeed as essential to the exhaustive investigation of many legal inquiries as is the function of the retained advocate. The duty of the expert is clearly not to determine for himself the main subject of dispute, but to assist in its right determination by others ; by bringing out clearly and forcibly indeed, but also with fairness and scrupulousness, all the facts and inferences that support the particular view which has alone been fully laid open to him. Accordingly, he on his side, and his antagonist on the other side, must, in the exercise of their common function, be prepared to submit imperturbably to whatever probing of their conflicting representations is necessary to bring out the unbiassed truth of the particular matter to be decided on, by a tribunal of which they themselves very properly form no part. But the tribunal, in coming to a decision, occasionally has recourse even now, and with acknowledged advantage, to the aid of an independent expert-assessor ; and it may fairly be contended, that in legal inquiries involving complicated scientific issues, the decisions of the tribunal by which they are judicially determined would be entitled to greater weight, if more commonly than is now the case, they were aided by the special knowledge of an expert-assessor, not as a substitute for, but as a proper complement to the retained expert. The retained chemical expert has come into existence because he was needed ; and the need which is now springing up for the expert chemical assessor, is one which the Institute of Chemistry may do much both to foster and to supply. It is not to be concealed, moreover, that many chemists are desirous of seeing retained experts treated altogether differently from ordinary witnesses as to fact, and the experts on the one side put into direct communication with those on the other. And supposing this, or some yet other view to prevail

generally, it is clear that the Institute of Chemistry might be fitly and hopefully occupied in an effort to carry out any such recognised object of general professional desire.

Among the many modes of usefulness open to the Institute, there is, however, one important function of a professional body from which it would seem to be almost wholly precluded. But for the existence of other organizations, such as the Chemical Society, the Society of Chemical Industry, the Pharmaceutical Society, and the Society of Public Analysts, &c., it might, like the Institution of Civil Engineers and the Institute of British Architects, become an important agency for discussing the methods and results of professional work; for the publication of original memoirs and the discussions thereon; and for the diffusion of literature bearing alike on the science and practice of the profession. The inability of the Institute of Chemistry to take up this position constitutes, without doubt, a permanent disadvantage to it as a particular corporation; but in this important work of a professional body, it is forestalled, and it must be admitted most satisfactorily forestalled, by existing societies. Its professional position in relation to these existing societies, would seem accordingly to be very much that of the College of Surgeons, for example, in relation to the Medico-Chirurgical Society, to the Pathological Society, to the Medical Society, and to the many other societies devoting themselves to the discussion and publication of memoirs bearing on different departments of the work of the medical profession. But while fulfilling something like, for instance, the rôle of the College of Surgeons, the Institute of Chemistry stands in one important particular at a great disadvantage in the comparison. The College of Surgeons is a wealthy corporation, and its income from property and examination-fees enables it not only to pay its current expenses without the aid of any subscription from its members, but also to keep up a magnificent museum and library. Our examination-fees are never likely to be a source of revenue to us, and at the present time, notwithstanding the generous moderation of our examiners, do not quite cover the expenses incident to the holding of our examinations. In order to pay our way, we have, accordingly, little beyond the annual subscriptions of our members to fall back upon. The somewhat onerous subscriptions and entrance-fees paid to the former Institute, sufficed

to meet the heavy expenditure attendant both on its original incorporation, and on its re-incorporation by Royal Charter. They, moreover, enabled the Institute not only to provide for current expenses, but to accumulate also a moderate, and just sufficient invested fund. In the future, unless indeed to meet on occasion some exceptional case, there will be need for no further contribution from members of the Institute than is adequate to cover, with a small margin, the current working expenses; but to fulfil such need, a revenue from all sources, of not less than £500 a year, must be supplied. For the provision of this income, which is the minimum income necessary to carry on its work, the Institute of Chemistry can only depend on the liberality and good will of its members; on their good will, since it will be for them to fix the rate of their annual subscription; and on their liberality, since their contributions will have to be accorded without the expectation of any tangible return; but solely with the object of enabling the Institute to exist, and carry on the duties with which it has been entrusted. The suggestion of a specific rate of annual contribution will, indeed, be made by the Council, but it will have to be approved and adopted by the members at large. In this, as in all other matters, the Council are but the agents of the general body; and it cannot be too strongly recognised how much the future success of the Institute must depend on a thorough understanding between the members at large, and their duly appointed executive. Necessarily, the work of the Council has to be conducted mainly by members of the Institute, resident in or near the metropolis; for however large may be the proportion of provincial members elected, it is obvious that their attendance at meetings alike of the Council and of its Committees, can be, at the best, but very irregular. The responsibility, however, for the general policy of the Institute and for the regulation of its affairs, rests not with the Council but with the general body. And their efficient control over the proceedings of the Institute, provided for broadly by the provisions of the Charter, will be further secured to them by the Bye-laws, which they alone are competent to enact and give effect to; and, from time to time, if need be, to supplement, or modify, or abrogate.

But though cramped in its resources, and excluded almost wholly from one field of usefulness, there is abundant work left

for the Institute of Chemistry, as a corporate society, to take up, and much good possible for it to achieve. There are, for instance, many matters affecting the relationship of practising chemists, both to one another, and to the parties for whom they are acting, in which it may exert its influence in favour of what is creditable and high-minded; and so of what is, in the long run, most advantageous. But it is not only in respect to the personal relationships of practising chemists, but as concerns also the wider relationship of the profession to the public at large, that the ability to exert a corporate, instead of a merely individual action in reference to matters affecting our status and interests, may be expected to prove beneficial. Our representation, in any matter with which we are specially concerned, may indeed not be attended to; but it can scarcely now be denied a hearing, or be treated as though of no account. Among its other objects, the Institute of Chemistry exists undoubtedly for the purpose of improving the position and prospects of professional chemists. It does not, however, lay itself out, nor is it fitted, for the exercise of what may be called a trades-union method of proceeding. Competition of the unqualified, and meretricious, and professionally irresponsible man, with the capable and carefully trained member of an exacting profession, will still be possible; but the trained and capable man will now have the advantage of having his competency and training attested by the guarantee of a public body, qualified, and officially authorised, to afford him such guarantee; while the community at large, called on to discriminate between the competitors, will be afforded adequate means of discrimination; and will have at their command the assurance, both of capability and of professional character, which membership of a more or less highly reputed corporation implies. As affecting in this way our own interests, the more or less reputation of the Institute becomes to each of us, a matter of personal concern. Necessarily, however, its reputation can be but of slow growth; and the younger of our members can, with the largest measure of confidence, look forward to experience the benefits derivable from its increase of reputation. In particular, the influence which the Institute of Chemistry may exercise on the estimation accorded to professional chemists, through the stimulus which it will afford to the higher scientific education of those entering the profession, cannot obviously make itself felt

for many years. But we may all of us, from the present outset, promote the reputation of the Institute, in which we have so manifest an interest, by our own individual conduct. Rules of professional conduct, opposed to prevalent habits, are for the most part incapable of enforcement ; but good example will tell in the long run, and the knowledge that certain courses of action are approved, while other courses of action are disapproved by the general body, cannot fail to bring about a survival of the fittest. The advancement of the Institute of Chemistry is our personal interest, and the estimation which may be gained for it is our personal gain. Each one of us may, and should, promote the reputation of the Institute by his individual character and conduct, by the soundness of his professional work, and by his scrupulous avoidance of everything which in other professions is held to be derogatory.

By the Charter of its incorporation, the Institute of Chemistry, as the now officially constituted embodiment of the chemical profession, is charged with certain duties and responsibilities in relation to the future of the entire profession ; and ought, with a view to the efficient fulfilment of these duties and responsibilities, to be in the widest sense, the representative of the entire profession. At present, it is constituted only of the 433 persons who were members of the original Institute at the time of its dissolution. In future, the sole mode of admission to the Fellowship, with a possible reserve to meet wholly exceptional cases, will be through the grade of Associateship, and by fulfilment of the educational requirements demanded of Associates,—a mode of admission clearly inapplicable to the case of persons already, and for some time past, in practice as professional chemists. For it cannot be overlooked, that although the Institute of Chemistry includes the great bulk of the chemical profession, and although it was granted its Charter of Incorporation on the ground among others, that it did comprise the great bulk of the profession, there are, nevertheless, a considerable number of persons practising as professional chemists throughout the country, who are not yet included within its ranks; and who have an undeniable claim to

be included, if they so desire, on conditions suitable to their position as persons already in practice, and without the exaction from them of any deterrent fine. Some, indeed, of these practising chemists can plead with truth, that they never had the opportunity of becoming members of the original Institute brought under their notice; but even the circumstance that others of them, to whom the opportunity was offered, did not give the matter sufficient attention, or deliberately held themselves aloof from a merely self-constituted organisation, does not bar their claim, as professional chemists of good repute, to be included within the now officially constituted organisation. It is inevitable that the inclusion of such chemists, on terms which are fair and fitting to them as persons already in practice, cannot be effected without some little injustice to most of us who are constituted members of the Institute by the provisions of the Charter. Some among us sacrificed much time and incurred not a little responsibility in founding the original Institute eight or nine years ago; others among us, with the hearty support of the general body, have spared ourselves no pains to carry on the work of the Institute from then till now; others again have during the last year or two laboured unsparingly, and with no little anxiety, to obtain for the Institute the official recognition with which our efforts have at length been rewarded; others again in order to become members of the Institute, have submitted to the ordeal of an exacting examination; while all of us have contributed to the considerable outlay by which the present position of the Institute has been achieved, and to the accumulation of a not inconsiderable invested fund so essential, among other things, to the assurance of its future. But all these sacrifices do not entitle us to use the trust that has been reposed in us for other than the plain purpose for which it was reposed, namely, the organization and advancement of the profession at large. And in this case as in so many others, the higher motive, and the lower motive intelligently appreciated, favour the same course of proceeding. We have to consider whether, by acting in a generous spirit, we shall not only best fulfil our obligation, but also best achieve one important end for which our past sacrifices have been incurred, namely, the improvement

of our own position, through a strengthening of the general body to which we belong, by increasing its numbers and influence, and its power of carrying out the objects for which it was constituted. Between the majority of ourselves and those practising chemists not yet included in our body, the chief difference is that we have, and they have not, taken steps to bring about the organization of our common profession ; a difference between us in the past which cannot justify our severance from one another in the future. They, as members of the same profession, have a common right with ourselves to the benefits arising from our now privileged organization ; and we, in a spirit of trust and fellowship, need not fear that, received with welcome into our body, they will take less interest than ourselves in the future of the Institute of Chemistry, or that they will be less earnest in the maintenance of its reputation, or be less mindful of its influence and welfare.



DOES NOT CIRCULATE